

June 11, 2012

The Honorable Barbara Boxer  
Chairman, Committee on Environment  
and Public Works  
United States Senate  
Washington, D.C. 20510

Dear Madam Chairman:

On behalf of the U.S. Nuclear Regulatory Commission (NRC), I am responding to your letter of May 15, 2012, regarding recent problems with the steam generators at the San Onofre Nuclear Generating Station (SONGS). You requested a summary of the NRC's plans for establishing whether Southern California Edison's (SCE) replacement of the steam generators required a license amendment, any documents related to the NRC's review of the design change, and documents in the NRC's possession related to SCE's determination that a license amendment was not necessary.

The NRC is currently re-examining the need for a license amendment at SONGS as part of an Augmented Inspection Team (AIT) review that is now underway. AITs are used by the NRC to promptly evaluate significant issues that arise at NRC-licensed facilities and to ensure that appropriate actions are taken. We are continuing to review in retrospect whether the licensee's evaluation should have resulted in a determination that the changes to the facility for the SONGS replacement steam generators (RSGs) required NRC review and approval for a design change through a license amendment.

As a part of this effort, we have obtained from the licensee various documents that relate to SCE's determination that a license amendment was not necessary. As requested, copies of those documents are enclosed. Because they contain sensitive licensee information, I ask that you please hold them in confidence, with access limited to Members and Committee staff.

NRC regulations at 10 CFR 50.59 and associated guidance in Regulatory Guide 1.187 include criteria for a licensee to determine when a license amendment is required for proposed changes to a facility. Historically, RSGs have been evaluated against these criteria and no license amendment was required. SCE's evaluation for the SONGS RSGs was consistent with these past practices and supported by all NRC inspections to date. As requested, copies of four publicly available NRC inspection reports that contain the reviews of the SONGS RSGs are enclosed.

The Office of Congressional Affairs (OCA) will inform your staff of the results of our AIT analyses when those actions are completed, as well as alert your office to all public meetings associated with SONGS. If you need additional information, please contact me or Ms. Rebecca Schmidt, Director of OCA, at (301) 415-1776.

Sincerely,

*/RA/*

Gregory B. Jaczko

Enclosures:

1. [SONGS NRC IIR 05000361/2009004](#)  
& [05000362/2009004](#), & NOV
2. [SONGS Unit 2 SG Replacement Project](#)  
[Inspection Report 05000361/2009007](#)
3. [SONGS Unit 2 SG Replacement Project](#)  
[Inspection Report 05000361/2010008](#)
4. [SONGS Unit 3 SG Replacement Project](#)  
[Inspection Report No. 05000362/2010009](#)
5. NECP 800071702, ASC D0018051  
SG Replacement – Unit 2
6. NECP 800071702, SG Replacement  
Unit 2, ASC D0018051
7. NECP 800071703, SG  
Replacement # Unit 3
8. SG Replacement – Unit 3

cc: Senator James M. Inhofe



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION IV  
612 EAST LAMAR BLVD, SUITE 400  
ARLINGTON, TEXAS 76011-4125

November 5, 2009

EA 09-270

Mr. Ross T. Ridenoure  
Senior Vice President and  
Chief Nuclear Officer  
Southern California Edison Company  
San Onofre Nuclear Generating Station  
P.O. Box 128  
San Clemente, CA 92674-0128

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION – NRC INTEGRATED  
INSPECTION REPORT 05000361/2009004 and 05000362/2009004, AND  
NOTICE OF VIOLATION

Dear Mr. Ridenoure:

On September 23, 2009, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your San Onofre Nuclear Generating Station, Units 2 and 3 facility. The enclosed integrated inspection report documents the inspection findings, which were discussed on September 24, 2009, with you, and other members of your staff.

The inspections examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

One violation is cited in the enclosed Notice of Violation and the circumstances surrounding it are described in detail in the subject inspection report. The violation involved the failure of work control and operations personnel to include maintenance activities in or near the electrical switchyard and offsite power components in the on-line risk assessment (EA-09-270). Although determined to be of very low safety significance (Green), this violation is being cited in the Notice because not all of the criteria specified in Section VI.A.1 of the NRC Enforcement Policy for a noncited violation were satisfied. Specifically, San Onofre Nuclear Generating Station failed to restore compliance within a reasonable time after the violation was first identified in NRC Inspection Report 05000361; 05000362/2009003. You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

This report documents four additional NRC identified and/or self-revealing findings of very low safety significance (Green). All of these findings were determined to involve violations of NRC requirements. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these findings as noncited violations, consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest the violations or the significance of the noncited violations, you should provide a response within

30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 612 E. Lamar Blvd, Suite 400, Arlington, Texas, 76011-4125; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the San Onofre Nuclear Generating Station facility. In addition, if you disagree with the characterization of any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region IV, and the NRC Resident Inspector at San Onofre Nuclear Generating Station. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, and its enclosure, will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

*/RA/*

Michael C. Hay, Chief  
Project Branch D  
Division of Reactor Projects

Dockets: 50-361, 50-362  
Licenses: NPF-10, NPF-15

Enclosures: Notice of Violation and  
NRC Inspection Report 05000361/2009004 and 05000362/2009004  
w/Attachment: Supplemental Information

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See next page

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File located: R:\ REACTORS\ SONGS\2009\SO 2009-004RP-GGW.doc ML093100051

SUNSI Rev Compl.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	ADAMS	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Reviewer Initials	MH
Publicly Avail	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Sensitive	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Sens. Type Initials	MH
RI:DRP/	SRI:DRP/	SPE:DRP/D	ACES:ES	C:DRS/EB1	C:DRS/EB2
JReynoso	GWarnick	DAllen	MHaire	RLKellar	NFO'Keefe
<b>/RA MCH for/</b>	<b>/RA MCH for/</b>	<b>/RA MHay for/</b>	<b>/RA RDeese/</b>	<b>/RA/</b>	<b>/RA/</b>
10/23/2009	10/23/2009	10/29/2009	10/26/2009	10/22/2009	10/22/2009
C:DRS/OB	C:DRS/PSB1	C:DRS/PSB2	C:DRP/D		
RELantz	MPShannon	GEWerner	MHay		
<b>/RA/</b>	<b>/RA/</b>	<b>/RA/</b>	<b>/RA/</b>		
10/22/2009	10/22/2009	10/30/2009	11/05/2009		

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## NOTICE OF VIOLATION

Southern California Edison Company  
San Onofre Nuclear Generating Station

Docket No: 50-361  
License No: NPF-10  
EA 09-270

During an NRC inspection conducted on June 24 through September 23, 2009, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Title 10 CFR 50.65(a)(4), states in part, that before performing maintenance activities (including but not limited to surveillance, postmaintenance testing, and corrective and preventive maintenance), the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities.

Contrary to the above, on August 25-27, 2009, work control and operations personnel failed to adequately assess and manage the increase in risk associated with maintenance activities. Specifically, maintenance activities in or near the electrical switchyard and offsite power components were not included in the on-line risk assessment.

This violation is associated with a Green Significance Determination Process finding.

Pursuant to the provisions of 10 CFR 2.201, Southern California Edison Company is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Regional Administrator, Region IV, and a copy to the NRC Resident Inspector at the facility that is the subject of this Notice, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to Notice of Violation EA-09-270," and should include: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC website at [www.nrc.gov/reading-rm/pdr.html](http://www.nrc.gov/reading-rm/pdr.html) or [www.nrc.gov/reading-rm/adams.html](http://www.nrc.gov/reading-rm/adams.html), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a

redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the basis for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

Dated this 5<sup>th</sup> day of November 2009.



**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION IV**

Docket: 50-361, 50-362

License: NPF-10, NPF-15

Report: 05000361/2009004 and 05000362/2009004

Licensee: Southern California Edison Co. (SCE)

Facility: San Onofre Nuclear Generating Station, Units 2 and 3

Location: 5000 S. Pacific Coast Hwy  
San Clemente, California

Dates: June 24, 2009, through September 23, 2009

Inspectors: I. Anchondo, Reactor Inspector  
T. Buchanan, Project Engineer  
A. Fairbanks, Reactor Inspector  
S. Makor, Senior Reactor Inspector  
C. Osterholtz, Reactor Inspector  
J. Reynoso, Resident Inspector  
G. Warnick, Senior Resident Inspector  
M. Young, Reactor Inspector

Approved By: Michael C. Hay, Chief  
Project Branch D  
Division of Reactor Projects

## SUMMARY OF FINDINGS

IR 05000361/2009004, 05000362/2009004; 06/24/2009 – 09/23/2009; San Onofre Nuclear Generating Station, Units 2 and 3, Integrated Resident and Regional Report; Adv. Weather.; Maint. Risk; Postmaint. Test; Event Follow-up.

The report covered a 3-month period of inspection by resident inspectors and an announced base line inspection by regional based inspectors. One cited violation and four Green noncited violations and of significance were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, "Significance Determination Process." Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

### A. NRC-Identified Findings and Self-Revealing Findings

Cornerstone: Initiating Events

- Green. The inspectors identified a cited violation of 10 CFR 50.65(a)(4) for the failure of work control and operations personnel to adequately assess and manage the increase in risk associated with maintenance activities. Specifically, on August 25-27, 2009, work control and operations personnel failed to adequately assess and manage the increase in risk associated with maintenance activities in or near the electrical switchyard and offsite power components. Due to the licensee's failure to restore compliance from the previous NCV 05000361; 05000362/2009003-04 within a reasonable time after the violation was identified, this violation is being cited in a Notice of Violation consistent with Section VI.A of the NRC Enforcement Policy. This finding was entered into the licensee's corrective action program as Nuclear Notifications NNs 200556120 and 200559128.

The failure to include maintenance activities in or near the electrical switchyard and offsite power components in the on-line risk assessment was a performance deficiency. This finding is greater than minor because the licensee's risk assessment failed to consider maintenance activities that could increase the likelihood of initiating events such as work in or associated with offsite power sources and the electrical switchyard, associated with the initiating events cornerstone. In accordance with Inspection Manual Chapter 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process," Step 4.1.1, the inspectors had the licensee re-perform the assessment, correcting the errors that rendered the original risk assessment inadequate. The finding is determined to have very low safety significance because the incremental core damage probability deficit and the incremental large early release probability deficit, used to evaluate the magnitude of the error in the licensee's inadequate risk assessment, were less than  $1 \times 10^{-6}$  and  $1 \times 10^{-7}$ , respectively. This finding has a crosscutting aspect in the area of problem identification and resolution associated with corrective action program because the licensee did not take appropriate corrective actions to address

safety issues and adverse trends in a timely manner, commensurate with their safety significance and complexity [P.1(d)](Section 1R13).

#### Cornerstone: Mitigating Systems

- SL-IV. The inspectors identified a noncited violation of 10 CFR 50.71(e)(4) for the failure of licensing personnel to submit revisions to the Updated Final Safety Analysis Report reflecting changes to the Unit 2 safety equipment building emergency core cooling pump room piping penetration that were in place for more than 24 months. Specifically, for the reporting periods between (1) July 2005 and June 2007; and (2) July 2007 and June 2009, licensing personnel failed to submit complete revisions to the Updated Final Safety Analysis Report reflecting the removal of the boot seal from the Unit 2 emergency core cooling system train B pump room penetration. This seal was removed in July 2005 and was left in this condition as discovered by the inspectors in August 2009. This finding was entered into the licensee's corrective action program as Nuclear Notification NN 200550985.

The failure of licensing personnel to submit revisions to the Updated Final Safety Analysis Report to describe changes to the Unit 2 safety equipment building emergency core cooling pump room piping penetration that were in place for more than 24 months was a performance deficiency. The finding was determined to be applicable to traditional enforcement because the NRC's ability to perform its regulatory function was potentially impacted by the licensee's failure to update the Updated Final Safety Analysis Report in a timely manner. The finding was determined to be a Severity Level IV violation in accordance with Section D.6 of Supplement I of the NRC Enforcement Policy. The finding is more than minor because the degraded flood barrier is associated with the external events attribute of the mitigating systems cornerstone and adversely affects the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheets, the finding is determined to have very low safety significance because the finding did not result in a loss of operability or functionality. This finding has a crosscutting aspect in the area of problem identification and resolution because the licensee failed to take appropriate corrective actions to address safety issues and adverse trends in a timely manner, commensurate with their safety significance and complexity [P.1(d)](Section 1R01).

- Green. The inspectors identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to follow corrective action program procedures to address deficiencies associated with postmaintenance testing. Specifically, between April 20 and May 14, 2009, the licensee failed to follow Procedure SO123-XX 1 ISS2, "Notification Initiation and Processing," Revision 23, to report a problem associated with the adequacy of postmaintenance testing until prompted by the inspectors. Emergency chiller ME336 was restored to operable on April 19, following a maintenance evolution, then declared

inoperable on April 20, approximately 8 hours later when operations personnel identified an operability issue associated with the equipment configuration. However, licensee personnel failed to recognize that the postmaintenance testing may have been inadequate, in that, emergency chiller ME336 was returned to service in an inoperable condition, until prompted by the inspectors on several occasions between April 20 and May 13. This finding was entered into the licensee's corrective action program as Nuclear Notification NN 200427700.

The failure to follow corrective action program procedures to identify and correct a condition adverse to quality was a performance deficiency. The finding is greater than minor because the failure to identify and correct deficiencies associated with postmaintenance testing would have the potential to lead to a more significant safety concern if left uncorrected. The finding is associated with the mitigating systems cornerstone. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheets, the finding is determined to have very low safety significance because the finding did not affect both trains of any single mitigating system or represent an actual loss of a safety function of a single train for greater than its technical specification allowed outage time. The finding has a crosscutting aspect in the area of problem identification and resolution associated with corrective action program because the licensee failed to identify and correct deficiencies associated with inadequate postmaintenance testing at a threshold commensurate with the safety significance [P.1(a)](Section 1R19).

- Green. A self-revealing noncited violation of 10 CFR Part 50, Appendix B, Criterion IV, "Procurement Document Control," was identified for the failure of procurement engineering personnel to include requirements necessary to assure adequate quality in a safety-related component. Specifically, on June 2, 2006, the procurement document did not specify limits on the amount of moisture allowed in the hydraulic fluid used during refurbishment of hydraulic dump valves at an off-site vendor, resulting in a main feedwater isolation valve and a main steam isolation valve being inoperable for greater than their technical specification allowed outage time. These occurrences were documented in Licensee Event Report 2007-004-00 and Unit 2 was shutdown in order to determine the extent of condition. The licensee determined these valve failures were caused by corrosion due to the introduction of moisture-contaminated Fyrquel® hydraulic fluid at the vendor facility. The procurement documents used to contract the replacement and refurbishment services did not include any moisture limits, nor did the vendor documents which were reviewed and approved by the licensee, although these limits were specified in both maintenance and operations procedures at the time. This finding was entered into the licensee's corrective action program as Action Request AR 071000901.

The failure to include moisture limits in the procurement documents in order to maintain the quality of a safety-related component was a performance deficiency. The finding is more than minor because it is associated with the equipment performance attribute of the mitigating systems cornerstone and affects the cornerstone objective to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences.

The inspectors evaluated the issue using the Significance Determination Process Phase 1 Screening Worksheet for the Initiating Events, Mitigating Systems, and Barriers Cornerstones provided in Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings." The inspectors determined that this finding represented a loss of safety function of a single train for greater than the technical specification allowed outage time. This required that a Phase 2 estimation be completed. Because the Phase 2 risk-informed notebook did not include appropriate targets for the equipment conditions at the time of discovery, the senior reactor analyst determined that a Phase 3 analysis was required. The analyst calculated a total  $\Delta$ CDF of  $1.5 \times 10^{-8}$ , therefore this finding is of very low safety significance. A crosscutting aspect is not assigned since the cause of the performance deficiency is not indicative of current performance (Section 4OA3).

Cornerstone: Emergency Preparedness

- SL-IV. A self-revealing noncited violation of 10 CFR 50.72 was identified for the failure to notify the NRC in the time required after computer engineering personnel discovered an event requiring an eight hour notification. Specifically, on July 13, 2009, Nuclear Regulatory Affairs personnel failed to notify the NRC, within 8 hours after the discovery of a loss of the ability to activate 10 Community Alert Sirens located on the Camp Pendleton Marine Corp Base. The NRC was notified of the loss of the ability to activate the Community Alert Sirens, approximately 24 hours late, on July 14, 2009. This finding was entered in the licensee's corrective action program as Nuclear Notification NN 200501125.

The failure to notify the NRC of an event in the time required by 10 CFR 50.72 was a performance deficiency. The finding was determined to be applicable to traditional enforcement because the NRC's ability to perform its regulatory function was potentially impacted by the licensee's failure to report the event. The finding is associated with the emergency preparedness cornerstone. The finding was determined to be a Severity Level IV violation in accordance with Section D of Supplement I of the NRC Enforcement Policy. The finding is not suitable for evaluation using the significance determination process, but has been reviewed by NRC management and is determined to be a finding of very low safety significance. The finding has a crosscutting aspect in the area of problem identification and resolution associated with corrective action program because computer engineering personnel failed implement the corrective action program at an appropriate threshold for identified issues [P.1(a)](Section 4OA3).

**B. Licensee-Identified Violations**

None

## REPORT DETAILS

### Summary of Plant Status

Unit 2 operated at essentially full power until July 24, 2009, when power was reduced to 90 percent, and further reduced to 60 percent on July 25, 2009, to maintain condenser vacuum due to heavy intake of seaweed causing restrictions in circulation water cooling flow. The unit returned to essentially full power on July 26. On September 9, 2009, Unit 2 reduced power to 85 percent to perform a scheduled maintenance activity involving heat treatment of the circulating water system. During this activity a circulating water gate failed to reposition properly and the heat treatment was aborted. Unit 2 returned to full power and repairs were made to the circulating water gate. On September 13, 2009, Unit 2 reduced power to 94 percent to perform the rescheduled heat treatment. During the heat treatment, a circulating water gate failed to reposition properly resulting in a loss of condenser vacuum followed by a turbine-reactor trip. Following circulating water gate repairs, Unit 2 returned to essentially full power on September 17, and remained there for the duration of the inspection period.

On July 25, 2009, Unit 3 reduced power to 90 percent to maintain condenser vacuum due to heavy intake of seaweed causing restrictions in circulation water cooling flow. The unit returned to essentially full power on July 26 and remained there for the duration of the inspection period.

### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### 1R01 Adverse Weather Protection (71111.01)

##### .1 Readiness for Impending Adverse Weather Conditions

###### a. Inspection Scope

On July 25, 2009, an advisory for heavy surf conditions with extreme tidal swings was issued. The inspectors observed the licensee's preparations, planning and response for the expected weather conditions. Severe weather conditions resulted in ingress of seaweed and kelp in the circulating water system. The inspectors reviewed licensee procedures and discussed potential compensatory measures with control room personnel. The inspectors focused on plant management's actions for implementing the station's procedures for ensuring adequate personnel for safe plant operation and emergency response would be available. The inspectors conducted a site walkdown including walkdowns of various plant structures and systems, including portions of the screen and rake intake systems and saltwater cooling system, to check for maintenance or other apparent deficiencies that could affect system operations during the severe weather. The inspectors also reviewed corrective action program items to verify that the licensee was identifying adverse weather issues at an appropriate threshold and entering them into their corrective action program in accordance with station corrective action procedures. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one readiness for impending adverse weather condition sample as defined in IP 71111.01-05.

b. Findings

No findings of significance were identified.

.2 Readiness to Cope with External Flooding

a. Inspection Scope

Between August 12-20, 2009, the inspectors evaluated the design, material condition, and procedures for coping with the design basis probable maximum flood. The evaluation included a review to check for deviations from the descriptions provided in the Updated Final Safety Analysis Report (UFSAR) for features intended to mitigate the potential for flooding from external factors. As part of this evaluation, the inspectors checked for obstructions that could prevent draining, and determined that barriers required to mitigate the flood were in place and operable. Additionally, the inspectors performed a walkdown of the Unit 2 safety equipment building emergency core cooling pump rooms to identify any evidence of external flooding. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one external flooding sample as defined in IP 71111.01-05.

b. Findings

Introduction. The inspectors identified a Severity Level IV noncited violation of 10 CFR 50.71(e)(4) for the failure of licensing personnel to submit revisions to the UFSAR reflecting changes to the Unit 2 safety equipment building emergency core cooling pump room piping penetration that were in place for more than 24 months.

Description. On August 12, 2009, the inspectors performed a walkdown of the Unit 2 safety equipment building emergency core cooling pump room. During the walkdown, the inspectors noted water leaking from the piping penetration, being collected in a catch basin, and directed through tubing to a nearby floor drain. Action Request AR 031001064 and Maintenance Order MO 04091323000 documented that this configuration had been in place since July 25, 2005. Procedure SO123-XXX-5.2, "Control of Licensing Document Changes," Revision 11, Steps 6.1.3, 6.1.5 and Attachment 3, Steps II and III.G, stated, in part, that the licensee UFSAR updates, which shall not exceed a 24 month interval, shall include all 10 CFR 50.59 evaluations that change the description of any structure, system, or component from the way it is described in the UFSAR that was implemented six or more months prior to the submittal date.

Updated Final Safety Analysis Report Table 3.4-1 stated that the penetration was sealed against flood water by one or more of the following devices: waterstops, boots, conduit pressure rings and sealing grommet, duct terminator, pipes or sleeve poured in concrete. The original design of the plant had a waterstop providing the UFSAR specified floodwater sealing function. In October 1996, the waterstop had degraded, and a change to the licensee's plant flood analysis review stated that, "To satisfy the water barrier requirement, a BISCO® boot seal shall be installed on the safety equipment building side of the wall for each penetration." In October 2003, Action

Request AR 031001064 was written documenting that this BISCO® seal was degraded. In July, 2005, the BISCO® seal (for sealing against flood) and the fire barrier seal were removed to allow installation of a new seal that would perform both the flood sealing and fire barrier functions. This new seal could not be installed because of the continued water leakage through the penetration, and the penetration was left without an installed flood seal in the safety equipment building emergency core cooling system train B pump room. An interim 10 CFR 50.59 evaluation was performed stating that the temporary removal of this seal was allowed. The UFSAR was not updated to reflect this configuration change, which was in place for greater than the 24 month interval for UFSAR updates.

Analysis. The failure of licensing personnel to submit revisions to the UFSAR to describe changes to the Unit 2 safety equipment building emergency core cooling pump room piping penetration that were in place for more than 24 months was a performance deficiency. The finding was determined to be applicable to traditional enforcement because the NRC's ability to perform its regulatory function was potentially impacted by the licensee's failure to update the UFSAR in a timely manner. The finding was determined to be a Severity Level IV violation in accordance with Section D.6 of Supplement I of the NRC Enforcement Policy. The finding is more than minor because the degraded flood barrier is associated with the external events attribute of the mitigating systems cornerstone and adversely affects the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheets, the finding is determined to have very low safety significance because the finding did not result in a loss of operability or functionality. This finding has a crosscutting aspect in the area of problem identification and resolution because the licensee failed to take appropriate corrective actions to address safety issues and adverse trends in a timely manner, commensurate with their safety significance and complexity [P.1(d)].

Enforcement. As required, in part, by 10 CFR 50.71(e)(4) UFSAR revisions must be filed annually or six months after each refueling outage provided the interval between successive updates does not exceed 24 months. By letter dated April 27, 1999, the licensee obtained an exemption by the NRC from certain requirements of 10 CFR 50.71(e)(4) and is required to update the UFSAR six months after each Unit 3 refueling outage and reflect all changes up to a maximum of six months prior to the date of filing. The Unit 3 outages ended in December 2006 and December 2008. Procedure SO123-XXX-5.2 stated, in part, that the licensee UFSAR updates shall include all 10 CFR 50.59 evaluations that change the description of any structure, system, or component from the way it is described in the UFSAR that was implemented six or more months prior to the submittal date.

Contrary to the above, for the reporting periods between (1) July 2005 and June 2007; and (2) July 2007 and June 2009, licensing personnel failed to submit complete revisions to the UFSAR reflecting the removal of the boot seal from the Unit 2 emergency core cooling system train B pump room penetration. Specifically, this seal was removed in July 2005 and was left in this condition as discovered by the inspectors in August 2009. Because the finding is of very low safety significance and has been entered into the corrective action program as Nuclear Notification NN 200550985, this



violation is being treated as a noncited violation consistent with Section VI.A of the NRC Enforcement Policy: NCV 0500361/2009004-01, "Failure to Submit Complete Revisions to UFSAR for Penetration Seal Changes."

#### **1R04 Equipment Alignments (71111.04)**

##### Partial Walkdowns

###### a. Inspection Scope

The inspectors performed partial system walkdowns of the following risk-significant systems:

- July 21, 2009, Unit 3, component cooling water system train A while train B was out of service for maintenance
- August 24, 2009, Units 2 and 3, emergency chilled water system train B
- September 15, 2009, Unit 3, containment spray system train A

The inspectors selected these systems based on their risk significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could affect the function of the system, and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, UFSAR, technical specification requirements, administrative technical specifications, outstanding work orders, nuclear notifications, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also walked down accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the corrective action program with the appropriate significance characterization. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of three partial system walkdown samples as defined by IP 71111.04-05.

###### b. Findings

No findings of significance were identified.

## **1R05 Fire Protection (71111.05)**

### **.1 Quarterly Fire Inspection Tours**

#### **a. Inspection Scope**

The inspectors conducted fire protection walkdowns that were focused on availability, accessibility, and the condition of firefighting equipment in the following risk-significant plant areas:

- June 30, 2009, Unit 2, penetration and fuel handling rooms 107 through 112
- July 14, 2009, Units 2 and 3, auxiliary control building elevation 50 foot
- July 17, 2009, Unit 2, fuel handling building elevation 63 foot
- August 24, 2009, Unit 3, saltwater cooling pump room and pipe tunnel
- August 31, 2009, Unit 2, safety equipment building elevations (-)15 foot 6 inches to 8 foot
- September 16, 2009, Unit 3, auxiliary feedwater pump room
- September 22, 2009, Unit 2, safety equipment building rooms 6 through 14 and 16 through 26

The inspectors reviewed areas to assess if licensee personnel had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant; effectively maintained fire detection and suppression capability; maintained passive fire protection features in good material condition; and had implemented adequate compensatory measures for out of service, degraded or inoperable fire protection equipment, systems, or features, in accordance with the licensee's fire plan. The inspectors selected fire areas based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events with later additional insights, their potential to affect equipment that could initiate or mitigate a plant transient, or their impact on the plant's ability to respond to a security event. Using the documents listed in the attachment, the inspectors verified that fire hoses and extinguishers were in their designated locations and available for immediate use; that fire detectors and sprinklers were unobstructed, that transient material loading was within the analyzed limits; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The inspectors also verified that minor issues identified during this inspection were entered into the licensee's corrective action program. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of seven quarterly fire-protection inspection samples as defined by IP 71111.05-05.

#### **b. Findings**

No findings of significance were identified.

.2 Annual Fire Protection Drill Observation

a. Inspection Scope

On September 2, 2009, the inspectors observed a fire brigade activation in which the licensee simulated a fire in Unit 3 saltwater cooling pump room. The observation evaluated the readiness of the plant fire brigade to fight fires. The inspectors verified that the licensee staff identified deficiencies; openly discussed them in a self-critical manner at the drill debrief, and took appropriate corrective actions. Specific attributes evaluated were: (1) proper wearing of turnout gear and self-contained breathing apparatus; (2) proper use and layout of fire hoses; (3) employment of appropriate fire fighting techniques; (4) sufficient firefighting equipment brought to the scene; (5) effectiveness of fire brigade leader communications, command, and control; (6) search for victims and propagation of the fire into other plant areas; (7) smoke removal operations; (8) utilization of preplanned strategies; (9) adherence to the pre planned drill scenario; and (10) drill objectives.

These activities constitute completion of one annual fire-protection inspection sample as defined by IP 71111.05-05.

b. Findings

No findings of significance were identified.

**1R07 Heat Sink Performance (71111.07A)**

a. Inspection Scope

The inspectors reviewed licensee programs, verified performance against industry standards, and reviewed critical operating parameters and maintenance records for the Unit 2 shutdown cooling heat exchanger. The inspectors verified that performance tests were satisfactorily conducted for heat exchangers/heat sinks and reviewed for problems or errors; the licensee utilized the periodic maintenance method outlined in Electric Power Research Institute Report NP 7552, "Heat Exchanger Performance Monitoring Guidelines;" the licensee properly utilized biofouling controls; the licensee's heat exchanger inspections adequately assessed the state of cleanliness of their tubes; and the heat exchanger was correctly categorized under 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one heat sink inspection sample as defined by IP 71111.07-05.

b. Findings

No findings of significance were identified.

## **1R11 Licensed Operator Requalification Program (71111.11)**

### a. Inspection Scope

On September 21, 2009, the inspectors observed licensed operator requalification training in the plant's simulator involved in training activities related to the Unit 2 refueling preparations, to verify that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

- Licensed operator performance
- Crew's clarity and formality of communications
- Crew's ability to take timely actions in the conservative direction
- Crew's prioritization, interpretation, and verification of annunciator alarms
- Crew's correct use and implementation of abnormal and emergency procedures
- Control board manipulations
- Oversight and direction from supervisors
- Crew's ability to identify and implement appropriate technical specification actions

The inspectors compared the crew's performance in these areas to pre-established operator action expectations and successful critical task completion requirements. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one quarterly licensed-operator requalification program sample as defined in IP 71111.11.

### b. Findings

No findings of significance were identified.

## **1R12 Maintenance Effectiveness (71111.12)**

### a. Inspection Scope

The inspectors evaluated degraded performance issues involving the following risk significant systems:

- July 30, 2009, Unit 3, atmospheric dump valve 3HV8421 failed to pass surveillance stroke test
- August 11, 2009, Unit 3, piping plugged around steam to auxiliary feedwater pump turbine strainer 3F-904 drain valve S31301MU691

The inspectors reviewed events such as where ineffective equipment maintenance has resulted in valid or invalid automatic actuations of engineered safeguards systems and independently verified the licensee's actions to address system performance or condition problems in terms of the following:

- Implementing appropriate work practices
- Identifying and addressing common cause failures
- Scoping of systems in accordance with 10 CFR 50.65(b)
- Characterizing system reliability issues for performance
- Charging unavailability for performance
- Trending key parameters for condition monitoring
- Ensuring proper classification in accordance with 10 CFR 50.65(a)(1) or (a)(2)
- Verifying appropriate performance criteria for structures, systems, and components classified as having an adequate demonstration of performance through preventive maintenance, as described in 10 CFR 50.65(a)(2), or as requiring the establishment of appropriate and adequate goals and corrective actions for systems classified as not having adequate performance, as described in 10 CFR 50.65(a)(1)

The inspectors assessed performance issues with respect to the reliability, availability, and condition monitoring of the system. In addition, the inspectors verified maintenance effectiveness issues were entered into the corrective action program with the appropriate significance characterization. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of two quarterly maintenance effectiveness samples as defined in IP 71111.12-05.

b. Findings

No findings of significance were identified.

**1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)**

a. Inspection Scope

The inspectors reviewed licensee personnel's evaluation and management of plant risk for the maintenance and emergent work activities affecting risk-significant and safety-related equipment listed below to verify that the appropriate risk assessments were performed prior to removing equipment for work:

- July 7, 2009, Units 2 and 3, emergency chilled water system train A compression tank level anomalies described in Nuclear Notification NN 200488993

- July 14, 2009, Unit 2, maintenance per Maintenance Order MO 800310673 in distribution panel 2Q0612 for non-class IE instrument bus 2
- July 29, 2009, Unit 2, emergency diesel generator train A inoperability due to load spikes observed during surveillance testing
- August 13-14, 2009, Unit 2, lifting and rigging preparations for heavy lifting associated with the steam generator replacement outage
- August 24, 2009, Units 2 and 3, emergency chiller ME335 maintenance outage
- August 25, 2009, Unit 2, steam generator replacement pre-outage activities near safety-related reserve auxiliary transformers
- August 26, 2009, Unit 2, tendon cable pull and spool work activities near 220 kilovolt reserve auxiliary transformers

The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that licensee personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When licensee personnel performed emergent work, the inspectors verified that the licensee personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work, discussed the results of the assessment with the licensee's probabilistic risk analyst or shift technical advisor, and verified plant conditions were consistent with the risk assessment. The inspectors also reviewed the technical specification requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of seven maintenance risk assessments and emergent work control inspection samples as defined by IP 71111.13-05.

b. Findings

Introduction. The inspectors identified a Green cited violation of 10 CFR 50.65(a)(4) for the failure of work control and operations personnel to include maintenance activities in or near the electrical switchyard and offsite power components in the on-line risk assessment.

Description. August 25-27, 2009, the inspectors observed contract personnel performing steam generator replacement preparation activities, which involved man-lift and crane operations in the vicinity of the Unit 2 reserve auxiliary transformers and overhead transmission lines. The reserve auxiliary transformers are components associated with the offsite power supply to safety-related electrical buses. The inspectors questioned whether these maintenance activities that could increase the likelihood of initiating events were considered in the Unit 2 on-line risk assessment. The inspectors determined that the risk impacting maintenance activities were not specifically included in the overall on-line plant risk assessment in accordance with Procedures SO123-XX-10, "Maintenance Rule Risk Management Program

Implementation," Revision 4, and SO23-XX-8, "Critical Activities Work Process Manual," Revision 2.

The inspectors identified NCV 05000361; 05000362/2009003-04, for a similar performance deficiency that occurred between March 26 and April 16, 2009. The inspectors reviewed corrective actions associated with the apparent cause evaluation for Nuclear Notification NN 200402733 to determine why the licensee failed to restore compliance within a reasonable time following identification of NCV 05000361; 05000362/2009003-04. The inspectors observed that the immediate action to restore compliance only included the use of required reading and work week meetings to instruct work management personnel of the lessons learned from the apparent cause evaluation, and the expectation to use Procedures SO123-XX-10 and SO23-XX-8 for performing qualitative risk assessment of work activities. The immediate action was completed on June 9, 2009. The inspectors concluded that the immediate action to restore compliance was inadequate since steam generator replacement preparation activities in the vicinity of the Unit 2 reserve auxiliary transformers continued without a means to ensure that operations personnel were aware of the risk impacting maintenance activities for incorporation into the daily on-line plant risk assessment.

The inspectors observed that other corrective actions were identified and planned as documented in the apparent cause evaluation. The additional corrective actions included revisions to Procedures SO123-XX-10, SO23-XX-8, and SO123-XX-11, "Switchyard Work Performance," to improve the ability of work management personnel to recognize work activities that have the potential to adversely affect structures, systems, and components and increase plant risk; and revamp the risk assessment and management program for control of maintenance activities to achieve performance consistent with industry best practices for complying with 10 CFR 50.65(a)(4). However, these additional corrective actions had not been completed at the time of the inspectors' observations on August 25-27, 2009.

Noncited Violation NCV 05000361; 05000362/2009003-04 had a crosscutting aspect in the area of human performance associated with resources because the licensee did not ensure that procedures and processes were adequate to properly assess and manage the risk associated with on-line maintenance [H.2(c)]. The inspectors observed that the additional, longer-term, corrective actions that were still in development at the time of the inspectors' observations on August 25-27, 2009, addressed the crosscutting aspect to correct the inadequate procedures and processes. However, no immediate or interim actions were implemented to compensate for the inadequate resources to ensure compliance with 10 CFR 50.65(a)(4) while risk impacting steam generator replacement preparation activities continued.

Nuclear Notification NN 200556120 was initiated to document the inspectors' observations on August 25-27, 2009. A white paper was included in the nuclear notification to delineate interim and long-term actions to restore compliance with 10 CFR 50.65(a)(4) for the continuation of steam generator replacement preparation activities. The interim actions included improved communications and coordination between steam generator replacement project, operations, and work management personnel to ensure that operations personnel were aware of the risk impacting maintenance activities for incorporation into the daily on-line plant risk assessment.

Analysis. The failure to include maintenance activities in or near the electrical switchyard and offsite power components in the on-line risk assessment was a performance deficiency. This finding is greater than minor because the licensee's risk assessment failed to consider maintenance activities that could increase the likelihood of initiating events such as work in or associated with offsite power sources and the electrical switchyard. This finding is associated with the initiating events cornerstone. In accordance with Inspection Manual Chapter 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process," Step 4.1.1, the inspectors had the licensee re-perform the assessment, correcting the errors that rendered the original risk assessment inadequate. The finding is determined to have very low safety significance because the incremental core damage probability deficit and the incremental large early release probability deficit, used to evaluate the magnitude of the error in the licensee's inadequate risk assessment, were less than  $1 \times 10^{-6}$  and  $1 \times 10^{-7}$ , respectively. This finding has a crosscutting aspect in the area of problem identification and resolution associated with corrective action program because the licensee did not take appropriate corrective actions to address safety issues and adverse trends in a timely manner, commensurate with their safety significance and complexity [P.1(d)].

Enforcement. Title 10 CFR 50.65(a)(4), states in part, that before performing maintenance activities (including but not limited to surveillance, postmaintenance testing, and corrective and preventive maintenance), the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities. Contrary to the above, on August 25-27, 2009, work control and operations personnel failed to adequately assess and manage the increase in risk associated with maintenance activities. Specifically, maintenance activities in or near the electrical switchyard and offsite power components were not included in the on-line risk assessment. This finding was of very low safety significance and was entered into the licensee's corrective action program as Nuclear Notifications NNs 200556120 and 200559128. Due to the licensee's failure to restore compliance from the previous NCV 05000361; 05000362/2009003-04 within a reasonable time after the violation was identified, this violation is being cited in a Notice of Violation consistent with Section VI.A of the NRC Enforcement Policy: VIO 05000361/2009004-02, "Failure to Assess and Manage Risk for Maintenance That Could Impact Offsite Power Components."

## **1R15 Operability Evaluations (71111.15)**

### **a. Inspection Scope**

The inspectors reviewed the following issues:

- June 25, 2009, Unit 2, excore channel D log power out of tolerance data
- July 10, 2009, Units 2 and 3, operability impact of a potential gas bubble in the emergency chilled water system train A
- August 3, 2009, Units 2 and 3, control room intake air trains A and B radiation instrumentation RIC7824 digital control power supply operability



- August 5, 2009, Unit 2, emergency diesel generator train A load spike while synchronized to the grid
- August 11, 2009, Unit 2, safety injection tank T009 inventory loss due to check valve leakage results in gas accumulation in the safety injection header
- August 20, 2009, Unit 2, ground water leaking into safety equipment building room 002 evaluation of impact to safety-related equipment

The inspectors selected these potential operability issues based on the risk-significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure that technical specification operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the technical specifications and UFSAR to the licensee's evaluations, to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations. Additionally, the inspectors also reviewed a sampling of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of six operability evaluations inspection samples as defined in IP 71111.15-05.

b. Findings

No findings of significance were identified.

**1R17 Evaluations of Changes, Tests, or Experiments and Permanent Plant Modifications (71111.17)**

a. Inspection Scope

The inspectors reviewed the effectiveness of the licensee's implementation of evaluations performed in accordance with 10 CFR 50.59, "Changes, Tests, and Experiments," and changes, tests, experiments, or methodology changes that the licensee determined did not require 10 CFR 50.59 evaluations. The inspection procedure requires the review of 6 to 12 licensee evaluations required by 10 CFR 50.59, 12 to 25 changes, tests, or experiments that were screened out by the licensee and 5 to 15 permanent plant modifications.

The inspectors reviewed 8 evaluations required by 10 CFR 50.59; 15 changes, tests, and experiments that were screened out by licensee personnel; and 12 permanent plant modifications. Document numbers of the evaluations, changes, and modifications reviewed are listed in the attachment.

The inspectors verified that when changes, tests, or experiments were made, that evaluations were performed in accordance with 10 CFR 50.59 and that licensee personnel had appropriately concluded that the change, test or experiment can be accomplished without obtaining a license amendment. The inspectors also verified that safety issues related to the changes, tests, or experiments were resolved. The inspectors reviewed changes, tests, and experiments that licensee personnel determined did not require evaluations and verified that the licensee personnel's conclusions were correct and consistent with 10 CFR 50.59. The inspectors also verified that procedures, design, and licensing basis documentation used to support the changes were accurate after the changes had been made.

In the inspection of modifications the inspectors verified that supporting design and license basis documentation had been updated accordingly and was still consistent with the new design. The inspectors verified that procedures, training plans and other design basis features had been adequately accounted for and updated. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one sample as defined in Inspection Procedure 71111.17-05. Credit for these activities may be taken for part of NRC inspection Procedure 50001, "Steam Generator Replacement."

b. Findings

No findings of significance were identified.

**1R19 Postmaintenance Testing (71111.19)**

a. Inspection Scope

The inspectors reviewed the following postmaintenance activities to verify that procedures and test activities were adequate to ensure system operability and functional capability:

- April 19, 2009, Units 2 and 3, return to service testing for emergency chiller ME336 following planned maintenance
- July 28, 2009, Unit 2, replace annunciator power supplies PS1 and PS2 for emergency diesel generator train A per Maintenance Order MO 800321529
- August 14, 2009, Unit 2, high pressure safety injection pump train B test following replacement of leaking oil sight glass and safety valve along with routine maintenance on pump shaft coupling
- August 14, 2009, Unit 2, low pressure safety injection pump train B test following repair of leaking fitting downstream of flow orifice 2F06365 and breaker 2A0607 preventive maintenance
- August 25, 2009, Units 2 and 3, emergency chiller ME335 return to service testing following maintenance outage

- September 8, 2009, Unit 3, charging pump 3P190 return to service following shaft replacement

The inspectors selected these activities based upon the structure, system, or component's ability to affect risk. The inspectors evaluated these activities for the following (as applicable):

- The effect of testing on the plant had been adequately addressed; testing was adequate for the maintenance performed
- Acceptance criteria were clear and demonstrated operational readiness; test instrumentation was appropriate

The inspectors evaluated the activities against the technical specifications, the UFSAR, 10 CFR Part 50 requirements, licensee procedures, and various NRC generic communications to ensure that the test results adequately ensured that the equipment met the licensing basis and design requirements. In addition, the inspectors reviewed corrective action documents associated with postmaintenance tests to determine whether the licensee was identifying problems and entering them in the corrective action program and that the problems were being corrected commensurate with their importance to safety. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of six postmaintenance testing inspection samples as defined in IP 71111.19-05.

b. Findings

Introduction. The inspectors identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to follow corrective action program procedures to address deficiencies associated with postmaintenance testing.

Description. On April 20, 2009, the inspectors reviewed the control room logs and operations shift manager turnover log and noted that emergency chiller ME336 had been returned to service, following a 7 day maintenance outage, on April 19 at 7:20 p.m. The inspectors also noted that an equipment operator found the compression tank level out of specification, which impacted the operability of emergency chiller ME336, approximately 8 hours later. Following identification of the equipment configuration deficiency, Nuclear Notification NN 200396895 was initiated to document the equipment condition. Subsequently, emergency chiller ME336 was declared inoperable, the sensing line for the compression tank was filled and vented, and the chiller was restored to operable 2 hours later at 5:35 a.m. Nuclear Notification NN 200396895 documented the equipment condition, but did not address any issues with potential postmaintenance testing inadequacies that may have failed to identify the configuration issue.

The inspectors reviewed the timeline of events for the restoration of emergency chiller ME336 and the associated maintenance orders to identify whether the postmaintenance testing was inadequate, such that, the equipment was returned to service in an inoperable condition. During the review, the inspectors noted that make-up relief valve

PSV9887A was replaced during the maintenance outage, but leaked during chiller restoration on April 19, at the completion of the maintenance outage. As a result of the leak, the equipment was re-drained to establish the necessary conditions for maintenance, and valve PSV9887A was reworked on an emergent basis by the fix-it-now team. Following the rework, emergency chiller ME336 was restored, tested, and declared operable on April 19 at 7:20 p.m.

The inspectors were concerned, based on their review, that the emergent rework on valve PSV9887A may have altered the planned restoration and testing sequence. Additionally, the inspectors were concerned that the postmaintenance testing may have failed to verify the equipment properly aligned, such that, the equipment was returned to service in an inoperable condition. The inspectors communicated their concerns regarding potential inadequacies associated with the emergent work plan and postmaintenance testing to licensee personnel on April 20, April 29, and again on May 13, however, no licensee review of the return to service sequence was performed and no nuclear notification was written. On May 14, 2009, in response to the inspectors' concerns, maintenance personnel performed a preliminary investigation and determined that emergency chiller ME336 was inappropriately returned to service in an inoperable condition, requiring additional evaluation in the corrective action program. Consequently, the licensee initiated Nuclear Notification NN 200427700 to evaluate the issues to identify and correct any human performance errors that may have contributed to the equipment configuration deficiencies that were not identified when restoring emergency Chiller ME336 to operable.

Analysis. The failure to follow corrective action program procedures to identify and correct a condition adverse to quality was a performance deficiency. The finding is greater than minor because the failure to identify and correct deficiencies associated with postmaintenance testing would have the potential to lead to a more significant safety concern if left uncorrected. The finding is associated with the mitigating systems cornerstone. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheets, the finding is determined to have very low safety significance because the finding did not affect both trains of any single mitigating system or represent an actual loss of a safety function of a single train for greater than its technical specification allowed outage time. The finding has a crosscutting aspect in the area of problem identification and resolution associated with corrective action program because the licensee failed to identify and correct deficiencies associated with inadequate postmaintenance testing at a threshold commensurate with the safety significance [P.1(a)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Procedure SO123-XX-1 ISS2, "Notification Initiation and Processing," Revision 23, describes the requirements for reporting problems affecting plant equipment, programs, processes, procedures, and events to ensure that timely corrective actions are taken commensurate with the safety significance of the reported problem. Procedure SO123-XX-1 ISS2, Step 6.2.1, requires that, "An NN Notification **SHALL** be generated for all problems (events, failures, inappropriate actions,

deficiencies, or trends involving equipment, human performance, or programs contrary to safety, compliance or production) identified." Contrary to the above, between April 20 and May 14, 2009, the licensee failed to follow Procedure SO123-XX-1 ISS2, to report a problem associated with the adequacy of postmaintenance testing until prompted by the inspectors. Specifically, emergency chiller ME336 was restored to operable on April 19, following a maintenance evolution, then declared inoperable on April 20, approximately 8 hours later when operations personnel identified an operability issue associated with the equipment configuration. However, licensee personnel failed to recognize that the postmaintenance testing may have been inadequate, in that, emergency chiller ME336 was returned to service in an inoperable condition, until prompted by the inspectors on several occasions between April 20 and May 13. Because this finding is of very low safety significance and has been entered into the licensee's corrective action program as Nuclear Notification NN 200427700, this violation is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000361; 05000362/2009004-03, "Failure to Follow Corrective Action Process for an Inadequate Postmaintenance Test."

## **1R22 Surveillance Testing (71111.22)**

### **a. Inspection Scope**

The inspectors reviewed the UFSAR, procedure requirements, and technical specifications to ensure that the seven surveillance activities listed below demonstrated that the systems, structures, and/or components tested were capable of performing their intended safety functions. The inspectors either witnessed or reviewed test data to verify that the significant surveillance test attributes were adequate to address the following:

- Preconditioning
- Evaluation of testing impact on the plant
- Acceptance criteria
- Test equipment
- Procedures
- Jumper/lifted lead controls
- Test data
- Testing frequency and method demonstrated technical specification operability
- Test equipment removal
- Restoration of plant systems
- Fulfillment of ASME Code requirements
- Updating of performance indicator data

- Engineering evaluations, root causes, and bases for returning tested systems, structures, and components not meeting the test acceptance criteria were correct
- Reference setting data
- Annunciators and alarms setpoints.

The inspectors also verified that licensee personnel identified and implemented any needed corrective actions associated with the surveillance testing.

- July 2, 2009, Unit 3, component cooling water pump 3P026 comprehensive inservice test
- July 4, 2009, Units 2 reactor coolant system water inventory balance and leak detection surveillance
- July 4, 2009, Units 3, reactor coolant system water inventory balance and leak detection surveillance
- July 7, 2009, Unit 3, engineered safeguards feature test per Procedure SO23-3.43.30, "ESF Subgroup Relays K-112A, K-625A, and K-725A Semiannual Test," Revision 5
- July 21, 2009, Unit 3, emergency diesel generator train B surveillance per Procedure SO23-3-3.23, "Diesel Generator Monthly and Semi-Annual Testing," Revision 38
- August 13, 2009, Unit 2, containment spray pump 2P013 inservice testing
- September 8, 2009, Unit 2, emergency diesel generator train B semiannual surveillance test

Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of seven surveillance testing inspection samples as defined in IP 71111.22-05.

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

**1EP6 Drill Evaluation (71114.06)**

Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of a routine licensee emergency and simulator based drill on August 19, 2009, to identify any weaknesses and deficiencies in

classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the Emergency Operations Facility, Operations Support Center, and Technical Support Center to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the licensee drill critique to compare any inspector-observed weakness with those identified by the licensee staff in order to evaluate the critique and to verify whether the licensee staff was properly identifying weaknesses and entering them into the corrective action program. As part of the inspection, the inspectors reviewed the drill package and other documents listed in the attachment.

These activities constitute completion of one sample as defined in IP 71114.06-05.

b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES**

**40A1 Performance Indicator Verification (71151)**

.1 Data Submission Issue

a. Inspection Scope

The inspectors performed a review of the data submitted by the licensee for the 2nd Quarter 2009 performance indicators for any obvious inconsistencies prior to its public release in accordance with Inspection Manual Chapter 0608, "Performance Indicator Program."

This review was performed as part of the inspectors' normal plant status activities and, as such, did not constitute a separate inspection sample.

b. Findings

No findings of significance were identified.

.2 Mitigating Systems Performance Index - Residual Heat Removal System

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index - Residual Heat Removal System performance indicator for Units 2 and 3, for the period from the 3<sup>rd</sup> quarter 2008 through the 2<sup>nd</sup> quarter 2009. To determine the accuracy of the performance indicator data reported during those periods, performance indicator definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, was used. The inspectors reviewed the licensee's operator narrative logs, issue reports, mitigating systems performance index derivation reports, event reports and NRC Integrated inspection reports for the period of July 2008 through June 2009, to validate the accuracy of the submittals. The inspectors reviewed the mitigating systems performance index

component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of two mitigating systems performance index residual heat removal system samples as defined by IP 71151-05.

b. Findings

No findings of significance were identified.

.3 Mitigating Systems Performance Index - Cooling Water Systems

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index - Cooling Water Systems performance indicator for Units 2 and 3, for the period from the 3<sup>rd</sup> quarter 2008 through the 2<sup>nd</sup> quarter 2009. To determine the accuracy of the performance indicator data reported during those periods, performance indicator definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, was used. The inspectors reviewed the licensee's operator narrative logs, issue reports, mitigating systems performance index derivation reports, event reports and NRC integrated inspection reports for the period of July 2008 through June 2009, to validate the accuracy of the submittals. The inspectors reviewed the mitigating systems performance index component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of two mitigating systems performance index cooling water system samples as defined by IP 71151-05.

b. Findings

No findings of significance were identified.

.4 Reactor Coolant System Leakage

a. Inspection Scope

The inspectors sampled licensee submittals for the Reactor Coolant System Leakage performance indicator for Units 2 and 3, for the period from the 4<sup>th</sup> quarter 2008 through the 2<sup>nd</sup> quarter 2009. To determine the accuracy of the performance indicator data reported during those periods, performance indicator definitions and guidance contained



in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, was used. The inspectors reviewed the licensee's operator logs, reactor coolant system leakage tracking data, issue reports, event reports and NRC integrated inspection reports for the period of October 2008 through June 2009, to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of two reactor coolant system leakage samples as defined by IP 71151-05.

b. Findings

No findings of significance were identified.

**40A2 Identification and Resolution of Problems (71152)**

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Safety, Occupational Radiation Safety, and Physical Protection

.1 Routine Review of Identification and Resolution of Problems

a. Inspection Scope

As part of the various base line inspection procedures discussed in previous sections of this report, the inspectors routinely reviewed issues during base line inspection activities and plant status reviews to verify that they were being entered into the licensee's corrective action program at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. The inspectors reviewed attributes that included: the complete and accurate identification of the problem; the timely correction, commensurate with the safety significance; the evaluation and disposition of performance issues, generic implications, common causes, contributing factors, root causes, extent of condition reviews, and previous occurrences reviews; and the classification, prioritization, focus, and timeliness of corrective. Minor issues entered into the licensee's corrective action program because of the inspectors' observations are included in the attached list of documents reviewed.

These routine reviews for the identification and resolution of problems did not constitute any additional inspection samples. Instead, by procedure, they were considered an integral part of the inspections performed during the quarter and documented in Section 1 of this report.

b. Findings

No findings of significance were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's corrective action program. The inspectors accomplished this through review of the station's daily corrective action documents.

The inspectors performed these daily reviews as part of their daily plant status monitoring activities and, as such, did not constitute any separate inspection samples.

b. Findings

No findings of significance were identified.

.3 Selected Issue Follow-up Inspection

a. Inspection Scope

During a review of items entered in the licensee's corrective action program, the inspectors recognized a corrective action item documenting the issue listed below. The inspectors considered the following during the review of the licensee's actions: (1) complete and accurate identification of the problem in a timely manner; (2) evaluation and disposition of operability/reportability issues; (3) consideration of extent of condition, generic implications, common cause, and previous occurrences; (4) classification and prioritization of the resolution of the problem; (5) identification of root and contributing causes of the problem; (6) identification of corrective actions; and (7) completion of corrective actions in a timely manner.

- July 13 through July 21, 2009, Unit 2, source handling tool damaged during pre-operational testing as documented in Nuclear Notification NN 200494723

These activities constitute completion of one in-depth problem identification and resolution sample as defined in IP 71152-05.

b. Findings

No findings of significance were identified.

.4 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a review of the licensee's corrective action program and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors focused their review on repetitive equipment issues, but also considered the results of daily corrective action item screening discussed in Section 4OA2.2, above, licensee trending efforts, and licensee human performance results. The inspectors nominally considered the period of June 2009

through September 2009, although some examples expanded beyond those dates where the scope of the trend warranted.

The inspectors also included issues documented outside the normal corrective action program in major equipment problem lists, repetitive and/or rework maintenance lists, departmental problem/challenges lists, system health reports, quality assurance audit/surveillance reports, self-assessment reports, and Maintenance Rule assessments. The inspectors compared and contrasted their results with the results contained in the licensee's corrective action program trending reports. Corrective actions associated with a sample of the issues identified in the licensee's trending reports were reviewed for adequacy.

- July 20 through July 31, 2009, Units 2 and 3, observed pre-job briefing activities associated with semi-annual surveillance testing of Unit 3 emergency diesel generator train B and Unit 2 new reactor fuel movement into the spent fuel pool to review adequacy of corrective actions for inspector identified weaknesses with pre-job briefings

These activities constitute completion of one single semi-annual trend inspection sample as defined in IP 71152-05.

b. Findings

No findings of significance were identified.

**4OA3 Event Follow-up (71153)**

.1 Event Follow Up

a. Inspection Scope

The inspectors reviewed the below listed events for plant status and mitigating actions to: (1) provide input in determining the appropriate agency response in accordance with Management Directive 8.3, "NRC Incident Investigation Program"; (2) evaluate performance of mitigating systems and licensee actions; and (3) confirm that the licensee properly classified the event in accordance with emergency action level procedures and made timely notifications to NRC and state/governments, as required.

- July 14, 2009, Units 2 and 3, loss of the ability to activate 10 community alert sirens
- September 14, 2009, Unit 3, emergency diesel generator train B failure to come up to operating speed due to relay failure

Documents reviewed by the inspectors are listed in the attachment.

These activities constitute completion of two inspection samples as defined in IP 71153-05.

b. Findings

Introduction. A self-revealing Severity Level IV noncited violation of 10 CFR 50.72 was identified for the failure to notify the NRC in the time required after computer engineering personnel discovered an event requiring an 8 hour notification.

Description. On July 13, 2009, at approximately 11 a.m., computer engineering personnel discovered a loss of the ability to activate 10 Community Alert Sirens located on the Camp Pendleton Marine Corp Base. Upon investigation, computer engineering personnel identified that the power strip to the siren cabinet at Camp Pendleton was tripped which caused the loss of the ability to activate the sirens. Following the discovery, computer engineering personnel re-energized the Camp Pendleton siren cabinet equipment and successfully ran a silent test on one of the 10 Camp Pendleton sirens. A review of the silent test log by computer engineering personnel identified that the 10 sirens may have been without power for approximately 72 hours. An Offsite Emergency Planning representative and a Telecommunications technician were notified of the identified condition and equipment restoration; however, no nuclear notification was written to document the condition in the corrective action program. On July 14, over 24 hours after computer engineering personnel discovered that 10 Camp Pendleton sirens may have been without power for approximately 72 hours, the Offsite Emergency Planning Manager and Nuclear Regulatory Affairs personnel became aware of the potentially reportable condition. On July 14, at approximately 7:12 p.m., Nuclear Notification NN 200501125 was initiated, followed by verbal notification to the NRC as required by 10 CFR 50.72. Followup investigation identified that the loss of sirens occurred on July 10, 2009, at approximately 6 p.m.

Analysis. The failure to notify the NRC of an event in the time required by 10 CFR 50.72 was a performance deficiency. The finding was determined to be applicable to traditional enforcement because the NRC's ability to perform its regulatory function was potentially impacted by the licensee's failure to report the event. The finding is associated with the emergency preparedness cornerstone. The finding was determined to be a Severity Level IV violation in accordance with Section D of Supplement I of the NRC Enforcement Policy. The finding is not suitable for evaluation using the significance determination process, but has been reviewed by NRC management and is determined to be a finding of very low safety significance. The finding has a crosscutting aspect in the area of problem identification and resolution associated with corrective action program because computer engineering personnel failed to implement the corrective action program at an appropriate threshold for identified issues [P.1(a)].

Enforcement. Title 10 CFR 50.72(b)(3)(xiii) requires, that the licensee shall notify the NRC, within eight hours of "Any event that results in a major loss of emergency assessment capability, offsite response capability, or offsite communications capability." Contrary to this requirement, on July 13, 2009, the licensee failed to notify the NRC, within 8 hours after the discovery of a loss of the ability to activate 10 Community Alert Sirens located on the Camp Pendleton Marine Corp Base. The NRC was notified of the loss of the ability to activate the Community Alert Sirens, approximately 24 hours late, on July 14, 2009. Because this finding is of very low safety significance and has been entered in the licensee's corrective action program as Nuclear Notification NN 200501125, this violation is being treated as a noncited violation, consistent with

Section VI.A of the NRC Enforcement Policy: NCV 05000361; 05000362/2009004-04, "Failure to Notify the NRC within Required Timeframe."

.2 Event Report Review

a. Inspection Scope

The inspectors reviewed the two below listed Licensee Event Reports and related documents to assess: (1) the accuracy of the Licensee Event Report; (2) the appropriateness of corrective actions; (3) violations of requirements; and (4) generic issues.

b. Observations and Findings

1. (Closed) Licensee Event Report 05000362/2008-001-00, "TS Required Shutdown due to EDG Repair Beyond Allowed Outage Time"

On September 1, 2008, plant operators manually initiated a plant shutdown to complete repairs on emergency diesel generator 3G003. During planned maintenance, an inspection of the generator revealed cracks in the shorting ring which required replacement of the generator. Following replacement postmaintenance testing, anomalous readings could not be resolved within the allowed outage time, necessitating the shutdown. These readings were later determined to be due to improper fit of a newly replaced bearing. The bearing was replaced and the generator restored to operable. The unit returned to Mode 1 on September 11, 2008. The inspectors considered licensee response to the initial event appropriate. The inspectors also considered licensee response to the postmaintenance test results to be appropriate. The licensee has documented this occurrence for tracking in their corrective action program. This licensee event report is closed.

2. (Closed) Licensee Event Report 05000361; 05000362/2007-004-00, "Technical Specification Violation Caused by Moisture Contamination in Hydraulic Dump Valve Solenoids"

On October 9, 2007, Unit 3 was shutdown for a maintenance outage. During the shutdown the main feedwater isolation valve to steam generator E-088 and the main feedwater block valve to steam generator E-089 failed to close. Additionally, during surveillance testing on October 18, 2007, the main steam isolation valve on steam generator E-089 failed to stroke closed when the train B hydraulic dump valve solenoids were de-energized. The valve closed satisfactorily on train A. The licensee determined the failure mechanism for all three failures, was corrosion caused by moisture-contaminated Fyrquel® hydraulic fluid introduced during refurbishment at a vendor facility. All affected hydraulic dump valves were replaced. The licensee evaluated various programmatic improvements to prevent procurement problems from recurring in Action Request AR 071000901. This licensee event report is closed.

Introduction. A Green self-revealing noncited violation of 10 CFR Part 50, Appendix B, Criterion IV, "Procurement Document Control," was identified for the failure of procurement engineering personnel to include, in the procurement documents, limits on the amount of moisture allowed in the hydraulic fluid used during refurbishment of

hydraulic dump valves at an off-site vendor. This failure resulted in equipment being inoperable for greater than the technical specification allowed outage time.

Description. On October 9, 2007, the licensee initiated a shutdown of Unit 3 for a maintenance outage. During the shutdown, Unit 3 main feedwater isolation valve to steam generator E-088 and main feedwater block valve to steam generator E-089 failed to close in the expected time on a close signal. On October 18, 2007, the main steam isolation valve on steam generator E-089 failed to stroke closed when the train B hydraulic dump valve solenoids were de-energized. These events revealed the licensee was in violation of Technical Specification 3.7.2 for a main steam isolation valve being inoperable longer than the allowed outage time and Technical Specification 3.7.3 for a main feedwater isolation valve being inoperable for longer than the allowed outage time. The main feedwater block valve was also inoperable and the actions required by Licensee Controlled Specification 3.3.100 to close the valve within 7 days and verify valve closure were not taken. These occurrences were documented in Licensee Event Report 2007-004-00 and Unit 2 was shutdown in order to determine the extent of condition. No other valve failures were noted.

The licensee's investigation determined that the isolation and block valve failures were caused by failures of the solenoid valves used to operate hydraulic dump valves which in turn operate the isolation/block valve. The solenoid valves failed due to corrosion, which the licensee determined was caused by moisture-contaminated Fyrquel® hydraulic fluid used at the vendor's facility during previous replacement of the solenoid valves and refurbishment of the hydraulic dump valves. All affected hydraulic dump valves were replaced. The adverse effect of moisture-contaminated Fyrquel® hydraulic fluid was known by the licensee when these services were procured, as both maintenance and operation procedures specified moisture limits. The procurement documents used to contract the replacement and refurbishment services did not include any moisture limits, nor did the vendor documents which had been reviewed and approved by the licensee.

Analysis. The failure to include moisture limits in the procurement documents in order to maintain the quality of a safety-related component was a performance deficiency. The finding is more than minor because it is associated with the equipment performance attribute of the mitigating systems cornerstone and affects the cornerstone objective to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. The inspectors evaluated the issue using the Significance Determination Process Phase 1 Screening Worksheet for the Initiating Events, Mitigating Systems, and Barriers Cornerstones provided in Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings." The inspectors determined that this finding represented a loss of safety function of a single train for greater than the technical specification allowed outage time. This required that a Phase 2 estimation be completed. Because the Phase 2 risk-informed notebook did not include appropriate targets for the equipment conditions at the time of discovery, the senior reactor analyst determined that a Phase 3 analysis was required. The dominant core damage events included a loss of offsite power, loss of instrument air, steam line break upstream of the main steam isolation valves, and a steam generator tube rupture. Risk important basic events included timely makeup to the condensate storage tank, restoration of offsite power within 2 hours following an event, and a plant induced conditional loss of offsite power following a reactor trip. The main steam isolation valves

remained capable of performing their safety functions, but the reliability of one valve was degraded by the inoperable solenoid. Based on this information, the analyst calculated a total  $\Delta$ CDF of  $6.3 \times 10^{-7}$ , therefore this finding is of very low safety significance. A crosscutting aspect is not assigned since the cause of the performance deficiency is not indicative of current performance.

Enforcement. 10 CFR Part 50, Appendix B, Criterion IV, "Procurement Document Control," states, in part, that measures shall be established to assure that requirements which are necessary to assure adequate quality are included in documents for procurement of equipment and services. Contrary to the above, on June 2, 2006, appropriate requirements regarding moisture limits on Fyrquel® hydraulic fluid were not included in the procurement documents for the replacement of solenoid valves and refurbishment of the hydraulic dump valves, although these limits were specified in both maintenance and operations procedures at the time. Because the finding is of very low safety significance, and has been entered into the licensee's corrective action program as Action Request AR 071000901, this violation is being treated as a noncited violation consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000362/2009004-05, "Failure to Specify Appropriate Requirements in Procurement Documents."

#### **40A5 Other Activities**

##### **.1 Quarterly Resident Inspector Observations of Security Personnel and Activities**

###### **a. Inspection Scope**

During this inspection period, the inspectors performed observations of security force personnel and activities to ensure that the activities were consistent with San Onofre Nuclear Generating Station security procedures and regulatory requirements relating to nuclear plant security. These observations took place during both normal and off-normal plant working hours.

These quarterly resident inspector observations of security force personnel and activities did not constitute any additional inspection samples. Rather, they were considered an integral part of the inspectors' normal plant status review and inspection activities.

###### **b. Findings**

No findings of significance were identified.

#### **40A6 Meetings**

##### **Exit Meeting Summary**

On September 2, 2009, the inspectors presented the results of the Permanent Plant Modifications Inspection to Mr. Ed Scherer, Director, Nuclear Regulatory Affairs, and other members of the licensee's staff. The licensee acknowledged the issues presented.

On September 24, 2009, the inspectors presented the inspection results to Mr. Ross Ridenoure, Senior Vice President and Chief Nuclear Officer, and other members of the licensee staff. The licensee acknowledged the issues and findings presented.

The inspectors asked the licensee whether any materials examined during these inspections should be considered proprietary. The licensee confirmed that all proprietary information was returned or destroyed during these inspections.



## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee Personnel**

D. Axline, Technical Specialist, Nuclear Regulatory Affairs  
D. Bauder, Plant Manager  
B. Corbett, Manger, Performance Improvement  
G. Cook, Manager, Nuclear Regulatory Affairs  
J. Fee, Manager, Site Emergency Preparedness  
S. Gardner, Senior Nuclear Engineer, Maintenance/System Engineering  
S. Genschaw, Manager, Maintenance & Construction Services  
M. Graham, Manager, Plant Operations  
A. Hochevar, Station Manager  
E. Hubley, Director, Maintenance & Construction Services  
G. Johnson, Jr., Senior Nuclear Engineer, Maintenance/System Engineering  
L. Kelly, Engineer, Nuclear Regulatory Affairs  
G. Kline, Senior Director, Engineering  
A. Martinez, Manager, Performance Improvement  
B. MacKissock, Director, Plant Operations  
N. Quigley, Manager, Maintenance/System Engineering  
B. Rausch, Manager, Design Engineering  
R. Richter, Supervisor, Maintenance/System Engineering  
C. Ryan, Manager, Maintenance & Construction Services  
A. Scherer, Director, Nuclear Regulatory Affairs  
A. Shean, Manager, Nuclear Oversight and Assessment  
R. St. Onge, Director, Maintenance/Systems Engineering  
J. Todd, Manager, Security  
D. Wilcockson, Manager, Operations Training

#### **NRC Personnel**

D. Loveless, Senior Reactor Analyst  
G. Replogle, Senior Reactor Analyst

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

05000361/2009004-02      VIO      Failure to Assess and Manage Risk for Maintenance That Could Impact Offsite Power Components (Section 1R13)

### Opened and Closed

05000361/2009004-01      NCV      Failure to Submit Complete Revisions to Updated Final Safety Analysis Report for Penetration Seal Changes (Section 1R01)

05000361/2009004-03      NCV      Failure to Follow Corrective Action Process for an Inadequate Postmaintenance Test (Section 1R19)  
05000362/2009004-03

05000361/2009004-04      NCV      Failure to Notify the NRC within Required Timeframe (Section 4OA3)  
05000362/2009004-04

05000362/2009004-05      NCV      Failure to Specify Appropriate Requirements in Procurement Documents (Section 4OA3)

### Closed

05000362/2008-001-00      LER      TS Required Shutdown due to EDG Repair Beyond Allowed Outage Time (Section 4OA3)

05000361/2007-004-00      LER      Technical Specification Violation Caused by Moisture Contamination in Hydraulic Dump Valve Solenoids (Section 4OA3)  
05000362/2007-004-00

## LIST OF DOCUMENTS REVIEWED

### **Section 1R01: Adverse Weather Protection**

#### Procedures

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
SO123-XV-5.1	Temporary Modification Control	10
SO123-XIII-4.600	Fire Protection Impairment	9
SO123-XXX-5.2	Control of Licensing Document Changes	11
SO123-XV-44	10 CFR 50.59 and 72.48 Program	10

Nuclear Notifications

NUMBER

200545500          200000306

Action Requests

NUMBER

040601014          031001064

Maintenance Orders

NUMBER

04091323000

Calculations

NUMBER

M-0120-15

Miscellaneous

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION / DATE</u>
	Updated Final Safety Analysis Report	April 2009
04120043-01	Fire Protection Impairment	January 19, 2007
Barrier-50.59-10564	Interim 50.59 Barrier Evaluation	01
Barrier-50.59-10565	Interim 50.59 Barrier Evaluation	01
Order: NECP 800071504	Replacement of Penetration Seal	

## Section 1RO4: Equipment Alignment

### Procedures

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
SO23-2-17.1	Component Cooling Water System Alignments	16
SO23-1-3.1	Emergency Chilled Water Operation	22
SO23-1-3.3	Emergency Chilled Water System Alignment and Outage Evolution	3
SO23-3-2.9	Containment Spray System Operation	25

### Maintenance Orders

#### NUMBER

30004167

### Drawings

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
40127ASO3	Component Cooling Water System (Pumps)	26
40127BSO3	Component Cooling Water System (Tanks)	28
40127CSO3	Component Cooling Water System (Heat Exchangers)	33
40127DSO3	Component Cooling Water System (Supply Headers)	18
40127ESO3	Component Cooling Water System (Return Headers)	26
40112A	P&I Diagram Safety Injection System	33
40114A	P&I Diagram Containment Spray System	15

**Section 1RO5: Fire Protection**

Procedures

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
SO23-1-5	Auxiliary Building Normal HVAC System Operation	21
SO123-XIII-4.600	Fire Protection Impairment	9
SO23-13-21	Fire, Abnormal Operating Instruction	17
SO123-I-1.20	Seismic Controls	9
SO123-XV-1.41	Control of Ignition Sources	13
SO23-XIII-4.13	Inspection for Control of Combustibles and Transient Fire Loads	1
SO23-XV-4.13	Control of Work and Storage Areas Within the Protected Area	5
SO123-I-1.34	Scaffolding Erection	26

Nuclear Notifications

NUMBER

200290045      200106625

Maintenance Orders

NUMBER

800077695      800076816      800295994      800131287

Drawings

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
40275	Area 2C13 Equipment Floor drains	7
2PE02.DWG	Unit 2 Pre-Fire Plans, Penetration and fuel Handling Elevation (-)18'-3" to 23'-6"	4
2PE05.DWG	Unit 2 Pre-Fire Plans, Penetration and Fuel Handling Elevation 63-6"	7
2/3-019	Pre-fire plans Saltwater Pipe Tunnel Elevcation (-)9'	6
2-006	Pre-Fire Plan Safety Equipment (-)15'-6" to 8'0"	6
2-006	Pre-Fire Plans Safety Equipment Building rooms 6 through 14 and 16 through 26	6
3-043	Pre-Fire Plans Auxiliary Feedwater Pump Room	5

Miscellaneous

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION / DATE</u>
SOFD 2009-09	Unit 3, 9' Saltwater Cooling Pump Room Fire Drill	September 2, 2009

**Section 1RO7: Heat Sink Performance**

Procedures

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
S023-V-3.26	Shutdown Cooling Heat Exchanger Testing	4

Nuclear Notifications

<u>NUMBER</u>
200003416

Maintenance Orders

NUMBER

800075419

Miscellaneous

NUMBER

TITLE

REVISION

AR 071101246

UFSAR Sections 5.4.7 and 7.4.1

DBD-SO23-740 Safety Injection, Containment Spray, and Shutdown Cooling Systems 9

**Section 1R11: Licensed Operator Requalification Program**

Procedures

NUMBER

TITLE

REVISION

SO23-5-1.5 Plant Shutdown from Hot Standby to Cold Shutdown 30

SO23123-XXI-8.6 Conducting Training in the Simulator 7

SO23-3-2.6 Shutdown Cooling Operation 26

Miscellaneous

NUMBER

TITLE

REVISION

RS09J01- TPG 2009 Shutdown Just in Time Training 0

**Section 1R12: Maintenance Effectiveness**

Procedures

NUMBER

TITLE

REVISION

SO23-3-3.16 Auxiliary Feedwater System Monthly Tests 13

Nuclear Notifications

NUMBER

200450694      200219184      200254634      200369847

Maintenance Orders

NUMBER

800275858

**Section 1R13: Maintenance Risk Assessment and Emergent Work Controls**

Procedures

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
SO23-XV-2	Troubleshooting Plant Equipment and Systems	3
SO23-1-3.3	Emergency Chilled Water System Alignments and Outage Evolutions	2
SO23-XX-28	On-Line Work Management Process	1
SO123-XX-10	Maintenance Rule Risk Management Program Implementation	4
SO123-I-1.13	NUREG 0612 Cranes, Rigging and Lifting Controls	17
SO123-I-7.22	Maintenance Procedure on Mobile Crane operations	14
SO23-1-3.1	Emergency Chilled Water System Operation	22
SO23-XX-8	Integrated Risk Management	2

Nuclear Notifications

NUMBER

200403904      200500374      200402733      200489790      200502477  
200196248      200519198      200394201      200559128      200226120  
200550174      200402733      200561603      200556120



Maintenance Orders

NUMBER

800331733	800331984	800333121	800337219	800332922
800332921				

Drawings

NUMBER

TITLE

REVISION

30114	One-Line Diagram - Regulated Non-IE 208/120 AC System	57
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Miscellaneous

NUMBER

TITLE

REVISION

OSM-1	Operations Dictionary	
SD-SO23-800	System Description	4
060800698-11	Engineering Change Package on reroute the 220Kv Lines to U2 RAT	0

**Section 1R15: Operability Evaluations**

Procedures

NUMBER

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	Failure Report	September 22, 2009
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	Unit 3 MSPI Derivation Report for Cooling Water System (Unavailability Index)	September 21, 2009

	Unit 3 MSPI Derivation Report for Cooling Water System (Unreliability Index)	September 21, 2009
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
612 EAST LAMAR BLVD, SUITE 400  
ARLINGTON, TEXAS 76011-4125

March 4, 2010

Mr. Ross T. Ridenoure  
Senior Vice President and  
Chief Nuclear Officer  
Southern California Edison Company  
San Onofre Nuclear Generating Station  
P.O. Box 128  
San Clemente, CA 92674-0128

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION – UNIT 2 STEAM  
GENERATOR REPLACEMENT PROJECT INSPECTION REPORT  
05000361/2009007

Dear Mr. Ridenoure:

On December 31, 2009, the U.S. Nuclear Regulatory Commission (NRC) completed a steam generator replacement inspection at your San Onofre Nuclear Generating Station, Unit 2 facility. The enclosed inspection report documents the inspection findings, which were discussed on February 2, 2010, with Mr. Wharton and other members of your staff.

The inspections examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents two NRC identified findings of very low safety significance (Green). Both if these findings were determined to involve violations of NRC requirements. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these findings as noncited violations, consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest these noncited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 612 E. Lamar Blvd, Suite 400, Arlington, Texas, 76011-4125; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the San Onofre Nuclear Generating Station facility. In addition, if you disagree with the characterization of any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region IV, and the NRC Resident Inspector at San Onofre Nuclear Generating Station. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, and its enclosure, will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Ryan E. Lantz, Chief  
Project Branch D  
Division of Reactor Projects

Docket Nos. 50-361

License Nos. NPF-10

Enclosure:

NRC Inspection Report 05000361/2009007  
w/Attachment: Supplemental Information

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3/3/10	3/4/10	3/3/10	3/4/10		

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**U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV**

Docket: 50-361

License: NPF-10

Report: 05000361/2009007

Licensee: Southern California Edison Co. (SCE)

Facility: San Onofre Nuclear Generating Station, Unit 2

Location: 5000 S. Pacific Coast Hwy  
San Clemente, California

Dates: March 1, 2009 through December 31, 2009

Inspectors: J. Adams, Reactor Inspector  
D. Allen, Senior Reactor Inspector  
I. Anchondo, Reactor Inspector  
T. Buchanan, Reactor Inspector  
J. Braisted, Project Engineer  
C. Denissen, Reactor Inspector  
M. Bloodgood, Reactor Inspector  
P. Elkmann, Senior Emergency Preparedness Inspector  
A. Fairbanks, Reactor Inspector  
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J. Johnson, Security Specialist  
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C. Osterholtz, Senior Operations Engineer  
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W. Sifre, Senior Reactor Inspector  
G. Warnick, Senior Resident Inspector  
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Approved By: Ryan Lantz, Chief  
Project Branch D  
Division of Reactor Projects

## SUMMARY OF FINDINGS

IR 05000361/2009007; 03/01/2009 – 12/31/2009; San Onofre Nuclear Generating Station, Unit 2 Steam Generator Replacement Report; Steam Generator Replacement Activities; Other Activities.

The report covered a 10-month period of inspection by resident and regional inspectors. Two Green findings, both of which were noncited violations of significance, were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, "Significance Determination Process." Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

### A. NRC-Identified Findings and Self-Revealing Findings

Cornerstone: Barrier Integrity

- Green. The inspectors identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion XIII, "Handling, Storage and Shipping," for the failure of contractor personnel to establish measures to ensure adequate controls for the storage and preservation of material, associated with the admixture and fly ash, to be used in the production of safety-related concrete. Specifically, on December 10, 2009, contractor personnel failed to properly control key materials from being exposed to the elements which could damage or deteriorate the material and adversely impact the properties of safety-related concrete. This finding was entered into the licensee's corrective action program as Nuclear Notification NN 200703527.

The finding is greater than minor because use of incorrect material, or material whose properties may have been altered due to improper storage, if left uncorrected, would have the potential to lead to a more significant safety concern. The finding is associated with the design control attribute of the Barrier Integrity Cornerstone and affects the cornerstone objective to provide reasonable assurance that physical design barriers (containment) protect the public from radionuclide release caused by accidents or events. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheets, the finding is determined to have very low safety significance because the finding did not represent an actual open pathway in the physical integrity of reactor containment and because the concrete for the containment opening had not yet been batched or placed into the containment structure. The finding has a crosscutting aspect in the area of human performance associated with work practices since the licensee failed to ensure supervisory and management oversight of work activities, including contractors, such that nuclear safety is supported [H.4(c)] (Section 4OA5.2).

- Green. The inspectors identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instruction, Procedures, and Drawings," for the failure of contractor personnel to follow procedures to ensure proper mixing and batching of safety-related concrete. Specifically, on December 19, 2009, contractor personnel failed to ensure each batch contained the specified proportion of hydration controlling admixture. This finding was entered into the licensee's corrective action program as Nuclear Notification NN 200715236.

The finding is greater than minor because the failure to follow procedures for mixing containment concrete, if left uncorrected, would have the potential to lead to a more significant safety concern. The finding is associated with the design control attribute of the Barrier Integrity Cornerstone and affects the cornerstone objective to provide reasonable assurance that physical design barriers (containment) protect the public from radionuclide release caused by accidents or events. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheets, the finding is determined to have very low safety significance because the finding did not represent an actual open pathway in the physical integrity of reactor containment and because the batch of the concrete in question met the desired design strength as verified by testing. The finding has a crosscutting aspect in the area of human performance associated with work practices since the licensee failed to ensure supervisory and management oversight of work activities, including contractors, such that nuclear safety is supported [H.4(c)] (Section 4OA5.2).

**B. Licensee-Identified Violations**

None

## REPORT DETAILS

### Summary of Plant Status

On September 27, 2009, Unit 2 was shutdown for a scheduled refueling outage (U2C16) and steam generator replacement. The unit remained shutdown for refueling outage U2C16 at the end of the inspection period.

### 4. OTHER ACTIVITIES

#### 40A5 Other Activities Steam Generator Replacement Activities (50001)

##### .1 Design and Planning Inspections

###### a. Inspection Scope

This inspection report documents inspection activities related to the San Onofre Nuclear Generating Station, Unit 2, steam generator replacement project.

These steam generator replacement inspection activities are not part of the normal baseline inspection program, but are performed on an as-needed basis. Therefore, no sample size is specified. The inspectors completed the applicable portion of Inspection Procedure IP 50001, "Steam Generator Replacement Inspection," with the exception of the post installation verification and testing inspections. These inspections are planned and will be documented at a later date, as necessary.

###### Engineering and Technical Support

Inspections to review engineering and technical support activities were performed prior to, and during, the steam generator replacement outage by resident and regional inspectors. Inspectors reviewed key design aspects and modifications associated with steam generator replacement.

The inspectors reviewed permanent plant modifications (engineering change packages) and documentation, including safety screens and evaluations, to verify that they were performed in accordance with regulatory requirements and plant procedures. The inspectors also reviewed manufacturer records of parts and tubes of the replacement steam generators and reviewed preservice baseline eddy current examination results of new tubes. These inspections are documented in NRC Inspection Report 05000361; 362/2009003, Sections 1R08 and 1R18, and NRC Inspection Report 05000361; 362/2009004, Section 1R17.

Specific documents reviewed during this inspection are listed in the attachment.

###### Lifting and Rigging

The inspectors reviewed activities associated with applicable engineering design, modification, testing and analysis associated with steam generator lifting and rigging, including:

- steam generator component safe load paths
- crane and rigging equipment
- heavy load haul path

The inspectors focused their review on evaluating for any potential impact to the operating unit. Other inspections completed as part of the baseline inspections are documented in NRC Inspection Report 05000361; 362/2009004, Section 1R13.

Specific documents reviewed during this inspection are listed in the attachment.

#### Radiation Protection Program

An inspection to review radiation protection controls was performed during the steam generator replacement outage by regional inspectors. The results of the inspection are documented in NRC Inspection Report 05000361; 362/2009005, Section 2OS1.

#### Security Considerations and Adverse Impact to Other Unit

The inspectors made frequent observations of security practices to verify that the licensee provided appropriate support for affected vital and protected area barriers during outage activities. The inspectors also checked for potential adverse impacts to Unit 3 (the nonoutage unit) caused by outage activities, equipment configurations, etc.

The inspectors reviewed steam generator replacement activities associated with risk management to minimize any adverse impact on the operating unit and common systems. The results of the inspection are documented in NRC Inspection Report 05000361; 362/2009005, Section 1R13.

Specific documents reviewed during this inspection are listed in the attachment.

#### b. Findings

No findings of significance were identified.

### .2 Steam Generator Removal and Replacement Inspections

#### a. Inspection Scope

The inspectors conducted steam generator removal and replacement inspections by performing selective inspections, consistent with the safety significance and inspection resources of the following areas:

#### Welding and Nondestructive Examination Activities

Inspectors reviewed or observed the following welding and nondestructive examination activities during the steam generator replacement outage:

- qualification certifications for the Non-Destructive Examinations (NDE) examiners

- NDE procedures and NDE technician qualification records to verify they meet ASME code requirements
- containment restoration plan and the NDE records to verify ASME code requirements were satisfied
- contractors and Southern California Edison processes to verify they meet ASME code requirements
- radiography films for several large bore pipe welds to verify the welds meet quality requirements
- cable tray restoration activities, including post maintenance testing
- results of mechanical snubber functional testing and associated nonconformance reports and nuclear notifications for safety related snubbers

The inspection results associated with pre-service NDE inspections are documented in NRC Inspection Report 05000361; 362/2009003, Section 1R08.

#### Containment Opening Restoration Activities

The inspectors reviewed licensee activities related to construction activities associated with material, design, fabrication, installation, examination and testing of the containment temporary opening and restoration.

The inspectors completed the following inspection activities:

- observation of restoration activities and review of the modification packages related to equipment hatch supports, containment liner and containment reinforcement bars
- verification of the ASME code versions and sections to ensure compliance and correct application to the code and other industry standards
- review of key containment design aspects found in the updated final safety analysis report to confirm there are no deviations from the safety analysis and licensing basis, including review of 10 CFR 50.59 screenings and evaluations
- review of the liner plate welds strength analysis to verify that the restored liner will be as strong as the original uncut liner
- review of the containment concrete pour analysis to ensure there will be no adverse impact on the liner plate
- review of the design requirements of liner plate stiffeners to ensure the design requirements were adequate to withstand the loads imposed during concrete placement operations

- visual inspections of liner plate stiffeners to confirm proper structural design requirements were implemented
- confirming the use of dedicated new anchor heads during tendon restoration or if reused anchor heads were placed in service that material integrity was verified by inspection
- confirmed that new tendon strands were used and adequate to support containment structural requirements
- review of the tendon duct or sheathing restoration process to ensure the tendon activities were adequate, including grease fill and retensioning, to ensure containment structural integrity was not impacted, including visual inspections of the installed vertical and horizontal replacement tendon sheathing to confirm leak tightness
- review of the engineering evaluations associated with containment opening repairs to re-enforcement bars including CadWeld joint design and weld splices
- confirmed use of weld splices in place of CadWelds satisfied code requirements to ensure it meet all aspects of the original containment structural design
- review of the CadWeld purchasing, installation and testing specifications
- observations of CadWeld sister splices in the field including verification of sister splices were made by each welder for the CadWeld splices (under the same conditions and location) and subsequently tensile-tested to ensure adequate tensile strength of the joint was achieved
- concrete batch plant operations including material storage and handling of concrete components
- material test results (cement, fine and coarse aggregate, water, and admixtures)
- concrete mix and proportion data, including batching results
- concrete transportation and placement

Relative to installation of concrete, the inspectors witnessed placement of concrete in the containment wall to restore the temporary construction opening. The inspectors examined the reinforcing steel to ensure it was installed in accordance with design requirements and was properly cleaned, observed the concrete forms to ensure tightness and cleanliness. The inspectors reviewed placement activities to ensure that activities pertaining to concrete delivery time, free fall, flow distance, layer thickness and concrete consolidation conformed to industry standards established by the American Concrete Institute (ACI). Concrete batch tickets were examined to ensure that the specified concrete was being delivered to the site. The inspectors also observed testing of the plastic concrete for slump, temperature, and molding of the concrete cylinders for

testing. Reviews were performed to ensure concrete testing was performed and the cylinders were molded in accordance with applicable American Society Testing and Materials (ASTM) requirements. In addition, the inspectors reviewed activities to ensure that concrete testing was performed by qualified personnel from an independent testing company, and that concrete placement activities were continuously monitored by licensee and contractor quality control and quality assurance personnel.

The inspectors examined the concrete batch plant to verify proper storage and separation of materials and temperature controls. The inspectors reviewed results of quality control acceptance testing performed on materials (cement, fine and coarse aggregate, and admixtures) used for batching. The inspectors also reviewed records documenting inspection of the concrete batch plant and the concrete truck mixers. Activities were reviewed to determine if the contractor's inspection of the trucks and batch plant were performed in accordance with the guidance of the National Ready Mix Concrete Association, if the batch plant scales were calibrated in accordance with National Ready Mix Concrete Association recommendations, and if mixer efficiency tests were performed on the truck mixers in accordance with ASTM C-94. The inspectors reviewed the concrete mix data to ensure that mix proportions for delivered concrete were selected based on trial concrete mix results, that quality control acceptance criteria for the plastic concrete were based on the trial mixes, and that the trial mix met concrete strength requirements.

#### Lifting, Rigging and Steam Generator Movement and Reconnection Activities

The inspectors observed and reviewed activities throughout the refueling outage associated with heavy lifting and rigging. The inspectors observed the implementation and reviewed documentation related to several structural modifications associated with the heavy lifting activities.

The inspectors also observed and reviewed engineering evaluations concerning the removal and reinstallation of the following structural modifications:

- construction of the outside lift system and runway
- lifting and rigging preparations associated with old steam generators removal
- interference removal and replacement of replacement steam generators
- temporary handling equipment construction and removal
- structural supports to facilitate steam generator replacement
- reactor cavity decking construction and removal
- movement and reconnection of replacement steam generators
- steam generator hold down / skirt bolts



- transfer of old steam generators to temporary storage

The results of this inspection are documented in NRC Inspection Report 05000361; 362/2009004, Sections 1R13 and 1R18.

#### Outage Operating Conditions

The inspectors used Inspection Procedure 71111.20 to verify proper outage conditions. Partial completion of this inspection are documented in NRC Inspection Report 05000361; 362/2009005, Section 1R20.

#### Radiation Protection Controls

An inspection to review radiation protection controls was performed during the steam generator replacement outage by regional inspectors. The results of the inspection are documented in NRC Inspection Report 05000361; 362/2009005, Section 2OS1.

#### Foreign Materials Control

The inspectors performed frequent observations of the steam generator replacement activities to verify the licensee was implementing proper foreign materials controls. In particular, the inspectors observed controls related to reactor coolant system and secondary side openings.

#### Temporary Services

The inspectors reviewed the work package and drawings, and then observed the installation, use, and removal of temporary services in the containment building during the outage. Instructions for the use and controls for construction power, acetylene, oxygen, and argon were reviewed, and the actual installation of each system was compared to the approved system sketches.

#### Additional Post-installation Verification and Testing

The inspectors observed implementation of the licensee's post-installation inspections and verifications of cable splicing and continually checks. Note that post-installation and testing activities are planned to occur after the conclusion of the inspection period for this report.

#### Storage of Old Steam Generators

The inspectors observed the transport of the old steam generators and reviewed the radiological safety plans for the temporary storage of the old steam generators.

Specific documents reviewed during this inspection are listed in the attachment.

### b. Findings

#### 1. Deficiencies Associated with Material Storage of Concrete Batching

Introduction. The inspectors identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion XIII, "Handling, Storage and Shipping," for the failure of contractor personnel to establish measures to ensure adequate controls for the storage and preservation of material, specifically the admixture and fly ash, to be used in the production of safety-related concrete.

Description. On December 10, 2009, the inspectors visited the batch plant and observed the following:

- Fly ash was stored in a locked warehouse; however, several pieces of siding were missing and the structure contained openings in the roof, which allowed water and moisture to enter the building.
- The High-Range Water Reducing admixture, HWRA-PS1466, contained in 55 gallon drums, was not being stored in accordance with manufacturer's recommendations, in that; they were being stored outside and not maintained above 40°F. The local area temperature records indicated that temperature dropped below 40°F on December 8, and no additional temperature records were available at the location where material was being stored.
- Contractor personnel surveillances for batch plant activities had been performed on July 10, July 22, and October 23, 2009; however, no other surveillances or receipt inspections for the Boral Micron, fly-ash, and admixtures had been performed or documented between October 23 and December 10, 2009, to ensure that concrete ingredients were controlled, handled, and protected properly.

The inspectors had concerns with these observations and discussed them with the licensee's steam generator replacement project personnel. As a result, additional surveillances from December 12-18, 2009, were initiated by the licensee's quality assurance personnel in accordance with station procedures. The results of these surveillances confirmed the conditions noted by the inspectors above. During these surveillances, the materials in question were verified, receipt inspected, and stored in accordance with the licensee's specification, manufacturer's data sheets, and ACI standards.

Specification SO23-617-10, "Specification for the Purchase of Containment Opening Concrete," Revision 1, Section 8.1, stated, in part, that, "The method of storing of all such materials shall be in accordance with ACI 301 and 304R." In addition, Section 16.3.2.A stated, in part, that, "Buyer's quality control shall insure that the concrete ingredients are stored, controlled, and protected properly." The American Concrete Institute standard 304R-3 referenced in Specification SO23-617-10, Section 2.3, stated that, "All cement should be stored in weather tight, properly ventilated structures, to prevent absorption of moisture." Further, Section 2.4 stated, in part, that "Fly ash, ground slag, or other pozzoloans (cement extenders) should be handled, conveyed and stored in the same manner as cement." Finally, the product data sheet for the HWRA-PS 1466, stated that, "The admixture must be stored at temperatures above 40°F."

Consequently, the licensee initiated Nuclear Notification NN 200703527 to evaluate the issues to identify and correct any human performance errors that may have contributed to these storage measures not being established and controls for the storage and preservation of material not being properly implemented.

Analysis. The failure of contractor personnel to establish measures and ensure adequate controls for the storage and preservation of material, specifically the admixtures and fly ash, to be used in production of safety-related concrete was a performance deficiency. The finding is greater than minor because use of incorrect material, or material whose properties may have been altered due to improper storage, if left uncorrected, would have the potential to lead to a more significant safety concern. The finding is associated with the design control attribute of the Barrier Integrity Cornerstone and affects the cornerstone objective to provide reasonable assurance that physical design barriers (containment) protect the public from radionuclide release caused by accidents or events. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheets, the finding is determined to have very low safety significance because the finding did not represent an actual open pathway in the physical integrity of reactor containment and because the concrete for the containment opening had not yet been batched or placed into the containment structure. The finding has a crosscutting aspect in the area of human performance associated with work practices since the licensee failed to ensure supervisory and management oversight of work activities, including contractors, such that nuclear safety is supported [H.4(c)].

Enforcement. Title 10 of the Code of Federal Regulations, Part 50, Appendix B, Criterion XIII, "Handling, Storage and Shipping," states, in part, that measures shall be established to control the storage and preservation of material and equipment in accordance with work and inspection instructions to prevent damage or deterioration. Specification SO23-617-10, "Specification for the Purchase of Containment Opening Concrete," Revision 1, established the manufacturer recommendations and American Concrete Institute ACI 304R-3 requirements for the storage and preservation of material, specifically the admixtures and fly ash, to be used in production of safety-related concrete. Contrary to the above, on December 10, 2009, the licensee failed to maintain materials to be used in safety-related concrete in accordance with quality controls specified in Specification SO23-617-10. Specifically, the licensee did not properly control key materials from being exposed to the elements which could damage or deteriorate the material, thus adversely affecting the properties of the concrete. Because this finding is of very low safety significance and has been entered into the licensee's corrective action program as Nuclear Notification NN 200703527, this violation is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000361/2009007-01, "Failure to Adequately Store and Preserve Materials for Used in Safety-Related Concrete."

#### Deficiencies Associated with Concrete Mixture

Introduction. The inspectors identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instruction, Procedures, and Drawings," for the failure of contractor personnel to follow procedures to ensure proper mixing and batching of safety-related concrete.

Description. On December 19, 2009, the inspectors observed concrete batching operations and delivery to the site associated with Unit 2 containment restoration activities. During the second delivery of concrete (Load 2), the inspectors reviewed the batch ticket at the site and identified incorrect proportions for the hydration controlling admixture (Delvo stabilizer). The batch ticket was signed by contractor quality control personnel prior to leaving the batch plant in accordance with the Specification SO23-617-10, "Specification for the Purchase of Containment Opening Concrete," Revision 1. The batch ticket was also reviewed by field engineering and quality control personnel upon arrival at the site but failed to identify any errors. The inspectors noted a discrepancy with the Load 2 batch ticket in that the quantity of Delvo admixture was incorrect. The inspectors noted the Delvo admixture quantity was approximately 53 percent of the required amount for the Load 2 batch as specified in the approved design mix. The inspectors immediately informed the licensee quality assurance personnel at the site of their concern that the concrete batch did not contain the specified design mix proportions for the Delvo admixture. Contractor engineering personnel informed the inspectors that the batch ticket information was acceptable because it was believed to be a computer error. The inspectors contacted the batch plant, and spoke with the operator to confirm the error, and determined that the Delvo admixture quantity on the batch ticket was, in fact, correct and the admixture quantity in the batch was not proportioned correctly. Because of the prompting by the inspectors, the licensee acknowledged that an error had occurred with the proportioning at the batch plant and documented this condition in Nuclear Notification NN 200715236.

Specification SO23-617-10, Section 12.2.1 stated, in part, that, "Concrete shall be proportioned according to the approved design mixture and that materials shall be measured and mixed in accordance with ASTM C 94." In addition, Section 12.2.4 stated that, "No truck shall leave the batch plant without carrying a completed batch ticket signed by the batch plant operator and countersigned by licensee's or buyer's quality control personnel."

After the inspectors identified the issue, subsequent batch tickets were reviewed in detail. In addition, an engineering evaluation was needed to determine whether the concrete in place was acceptable. This evaluation consisted of re-creating a representative concrete mix of the batch in question (Load 2) and concluded that the concrete in place would meet its design strength based on representative test cylinder break results.

Analysis. The failure to follow procedures, such that the second concrete batch (Load 2) contained incorrect proportions of the Delvo stabilizer admixture, was a performance deficiency. The finding is greater than minor because the failure to follow procedures for mixing containment concrete, if left uncorrected, would have the potential to lead to a more significant safety concern. The finding is associated with the design control attribute of the Barrier Integrity Cornerstone and affects the cornerstone objective to provide reasonable assurance that physical design barriers (containment) protect the public from radionuclide release caused by accidents or events. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 Worksheets, the finding is determined to have very low safety significance because the finding did not represent an actual open pathway in the physical integrity of reactor containment and because the

batch of the concrete in question met the desired design strength. The finding has a crosscutting aspect in the area of human performance associated with work practices since the licensee failed to ensure supervisory and management oversight of work activities, including contractors, such that nuclear safety is supported [H.4(c)].

Enforcement. Title 10 of the Code of Federal Regulations, Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," states, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Specification SO23-617-10, "Specification for the Purchase of Containment Opening Concrete," Revision 1, established the quality controls associated with the mixing of containment concrete and stated, in part, that, "Concrete shall be proportioned according to the approved design mixture and that materials shall be measure and mixed in accordance with ASTM C 94."

Contrary to the above, on December 19, 2009, contractor personnel failed to adequately mix and batch concrete in accordance with Specification SO23-617-10, "Specification for the Purchase of Containment Opening Concrete." Specifically, contractor personnel failed to correctly proportion the hydration controlling admixture in concrete Load 2, in accordance with the approved design mixture as specified in Specification SO23-617-10, and the load was subsequently placed in the Unit 2 containment opening. An engineering evaluation was required to assess the concrete properties of the incorrect proportion mixture to assure there was no safety impact to the Unit 2 containment. The result of the evaluation determined the Load 2 concrete was minimally impacted but overall strength requirements were satisfactory.

Because this finding is of very low safety significance and has been entered into the licensee's corrective action program as Nuclear Notification NN 200715236, this violation is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000361/2009007-02, "Incorrect Mixing and Batching Associated with Concrete."

#### **40A6 Meetings**

##### Exit Meeting Summary

On December 11, 2009, the inspectors presented results of the inservice team inspection to Mr. Al Hochavar, Station Manager, and other members of the licensee staff. The licensee acknowledged the issues presented.

On February 2, 2010, the inspectors presented the inspection results to Mr. Mike Wharton, Manager, Steam Generator Replacement Project, and other members of the licensee's staff. The licensee acknowledged the observations and findings presented. Some proprietary information was reviewed during this inspection but no proprietary information was included in this report.

#### **ATTACHMENT: SUPPLEMENTAL INFORMATION**

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee Personnel**

J. Armas, Supervisor, Maintenance Engineering Fluid Process  
D. Axline, Technical Specialist, Nuclear Regulatory Affairs  
D. Bauder, Plant Manager  
J. Carey, Technician, Health Physics  
G. Cook, Manager, Nuclear Regulatory Affairs  
D. Todd, Manager, Site Projects Oversight  
K. Gallion, ALARA Supervisor, Health Physics  
S. Genshaw, Manager, Maintenance Engineering  
C. Harberts, Manager, Steam Generator Replacement Project  
L. Hay, QA Manager, Bechtel  
A. Hochevar, Station Manager, Plant Operations  
E. Hubley, Director, Maintenance & Construction Services  
L. Kelly, Engineer, Nuclear Regulatory Affairs  
J. Madigan, Manager, Health Physics  
A. Matheny, System Engineer  
A. Meichler, Mechanical/System Engineering Supervisor  
M. Mihalik, Areva Project Manager, Steam Generator Replacement Project  
R. Nielsen, Supervisor, Nuclear Oversight  
B. Power, Operations Manager, Catalina Pacific  
C. Ryan, Manager, Maintenance & Construction Services  
D. Schafffer, Civil Engineer  
M. Wharton, Manager, Steam Generator Replacement Project  
G. Vechinski, Inservice Inspection/Steam Generator Support Supervisor

#### **NRC Personnel**

None

### **LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

#### **Opened and Closed**

05000361/ 2009007-01	NCV	Failure to Adequately Store and Preserve Materials for Used in Safety-Related Concrete (Section 40A5)
05000361/ 2009007-02	NCV	Incorrect Mixing and Batching Associated with Concrete (Section 40A5)

### **LIST OF DOCUMENTS REVIEWED**

## Section 4OA5: Other Activities

### Procedures

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
SO123-I-1.13	NUREG 0612 Crane, Rigging and Lifting Controls	17
SO23-617-1-M1414	San Onofre Nuclear Generating Station, Units 2 and 3; Divider Plate Weld Joint Separation Root Cause Evaluation Report	0
25221-PP-63	San Onofre Nuclear Generating Station, Units 2 and 3; Tendon Replacement Methodology Demonstration Program	0
25221-PP-05	San Onofre Nuclear Generating Station, Units 2 and 3; Containment Opening Plan	2
SO23-XXIV-3.8.3	In Process Visual Examination of the Temporary Containment Opening	0
25221-000-GPP-GCPC-00001	Concrete Operations	1
25221-002-C0P-3054-00127-000	Construction Opening Formwork and Concrete Placement	1
25221-002-C0P-3052-00124-000	Install Replacement Reinforcing Bar in the Containment Construction Opening	0
San Onofre 2&3 FSAR Section 3.8.1 Concrete Containment		
25221-000-4MP-T040-S0104	Bechtel Nondestructive Examination Standard Visual Examination VT-AWS D1.1	1
25221-000-4MP-T040-S0088	Bechtel Nondestructive Examination Standard Magnetic Particle Examination MT-AWS D1.1	0
25221-000-4MP-T040-S0124	Bechtel Nondestructive Examination Standard Magnetic Particle Examination MT-ASME	1

**Section 4OA5: Other Activities**

25221-000-4MP-T040-S0125	Bechtel Nondestructive Examination Standard Liquid Penetrant Examination PT(SR)-ASME	1
25221-000-4MP-T040-S0126	Bechtel Nondestructive Examination Standard Radiographic Examination RT- ASME III Piping	1
SO23-I-3.3	Reactor Vessel Head Removal and Storage	13
SO123-I-7.14	Maintenance and Inspection of Cranes	10
SO123-XIII-4.600	Fire Protection Procedure	10
SO23-XVII-3.8	Containment Structural Integrity Surveillance	2
SO23-I-2.39	Refueling Interval Functional Test of Mechanical Snubbers Surveillance	17
SO23-I-2.29	Routine Inspection of Mechanical Snubbers Surveillance	16
SO23-I-2.86	Test of Large Bore Hydraulic Snubbers Surveillance	1
SO123-XXI-1.11.13	Maintenance and Construction Services Training Program Description	25

Nuclear Notifications

NUMBER

ECP800072651	200638659	200441596	200394201	200409527
200397411	200721336	200718149	200718187	200717920
200718184	200718449	200718433	200676257	200685253
200682436	200695375	200643377	200628449	200639776



**Section 4OA5: Other Activities**

200697279          200690422

Maintenance Orders

<u>NUMBER</u>	<u>TITLE</u>	<u>DATE</u>
WPIR 25221-002-COP-3052-00124	Structural Field Welding checklist (SR-5C)	December 10, 2009
WR-1-D1.4	Welder Qualification Test Record	July 16, 2009
WPQR-1392	P1-Rebar (0.87 CE)	September 30, 2003

Drawings

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
35048	Underground Electrical Duct and Manhole System Plan, Unit 2 and 3. Sheet 1.	15
21062	Grading and Paving	13
C0-3000-00002	Unit 2 Construction Opening Tendon Removal and Replacement Pin	2
23199 – Sheet 1	Containment Interior Structure – Structural Steel/Column Arrangement and Details	8
23199 - Sheet 4	Containment Interior Structure – Structural Steel/Column Arrangement and Details	0

**Section 40A5: Other Activities**

SO23-916-7	Steam Generator Sliding Base Detail	0
0441	San Onofre Replacement Coolant Elbow	2
23056	Containment Structure Wall Liner and Insert Section & Details, Sht.5	0

Design Documents/Calculations/Specifications

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION/DATE</u>
25221-000-COC-7100-00011	Outside Lift System and Runway Erection and Collapse Load Drop Effects	0
25221-000-COC-9000-00003	Temporary Cargo Container OSG Shield Wall Seismic Evaluation	1
C-257-01.04.06	Evaluation of Restored Containment End-of- Life Analysis	0
C-257-04.02.01	Containment Liner PL Design; Shell Liner Plate	5
C-257-07.01.01	Vessel, Tank and Equipment Supports – Reactor Vertical Column Supports	3

## Section 4OA5: Other Activities

C-257-04.02.05	Containment Liner Plate Acceptance Criteria	0
C-257-06.06	Structure Design-Columns	1
25221-002-P0C-AB00-00001	Temporary Supports for Main Steam Piping for SG E088	0
C-257-01.04.05	Evaluation of Restored Containment-Concrete Modulus Ratio and Tendon Retensioning Forces	0
C-257-04.02.01	Containment Liner Plate Design-Shell Liner Plate	0
CS-C4	Reinforcement Steel Placement	9
25221-PP-05	Containment Opening Plan	2
SO123-XII-20.4	Receiving Inspection	9
Procurement Engineering Package (PEP) 5CS0012	SGRP Containment Opening Concrete	0

**Section 4OA5: Other Activities**

Procurement Engineering Package (PEP) 5CS0011	Concrete Type Materials Testing Service	2
S023-617-10	Specification for the purchase of containment opening concrete	1
S0123-201-09	Specification for Ready-Mixed Concrete for SONGS 1, 2 and 3	4
S023-617-13	Specification for the installation and testing of cadweld splices	1
S023-201-1	Specification for furnishing batch plant for San Onfore Generating Station Units 2 and 3,	May 2, 1973
Engineering Change Package (ECP) #061200409-6	Unit 2 Containment Opening	0
FCR 25221-002-C0F-0000-00194	Document as found spacing dimensions for inner mat rebar at construction opening	

Surveillances

<u>NUMBER</u>	<u>DATE</u>
Quality Surveillance Report No. 25221-QSSS-09-032	October 23, 2009

**Section 40A5: Other Activities**

Quality Surveillance Report No. 25221-QSVS-09-009 December 12, 2009

Batch Plant Catalina Pacific Surveillance Report 25221-002-GSM-GCB-00013 July 10, 2009

Batch Plant Catalina Pacific Surveillance Report 25221-002-GSM-GCB-00014 July 22, 2009

Work Orders

<u>NUMBER</u>				
800221591	800222569	800221469	800222569	800203777
800203779	800228343	800228176	800228230	800412976
800393594				

Miscellaneous

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION/DATE</u>
Chapter 4-B	SONGS Topical Quality Assurance Manual, Handling, Storage, and Shipping	20
S023-617-10-M17	Concrete Mix Design Testing and Qualification	1
RIDR No. RSO-0142-09	Inspection Summary for Concrete Materials Testing and Qualification, Fine and Coarse Aggregates,	October 3, 2009
RIDR No. RSO-0181-09	Inspection Summary for Concrete Materials Testing and Qualification, Fine and Coarse Aggregates	December 7, 2009

**Section 4OA5: Other Activities**

	Certificate of Conformance for Concrete Production Facilities for San Juan Batch Plant South Alley	March 2008 through March 2010
	Catalina Pacific Concrete Statement of Mix Design	August 5, 2008
S023-617-10-M15	Catalina Pacific-Mixer Uniformity Tests	0
20981, 20961, 20042, 19980, 20322, 21441, 19504, 2032, 16747, 20080, 9072, 20430, 20597, 21131, 2004320732	SONGS Material Receiving Reports	March 25 through December 31, 1975
122617/01	Jade-Sterling Steel 2 1/2" Hot Rolled Round Grade 1071 chemistry Data	July 1, 2003
N571824-00	Certificate of Analysis, 3/32" ARC filler 9018cm	January 28, 2002
N605916-00	Certificate of Analysis, 1/8" ARC filler 9018cm	
WPS-P1 Rebar (0.87 CE)	Welding Procedure Specification	0
PQR-1392	Welding Procedure qualification Record	September 30, 2003
AWS D1.4 -98	American Welding Society WPS qualification	1998
CMTR 271238 D	Certificate of Conformance ASTM A615-07 Material 10169443	August 19, 2009
2-MOP-7057-1	Repair/Replacement Plan S/G E089 Main Steam Severance & Reweld	0
2-MOP-7064-4	Repair/Replacement Plan S/G E089 RCS Severance & Reweld	2
Letter from D. S. Collins (NRC) to H. B. Ray (SCE)	San Onofre Nuclear Generating Station, Units 2 and 3 – Related to the Relief Request ISI-3-14 to use Subsequent Edition	October 31, 2005

**Section 4OA5: Other Activities**

	and Addenda of the Code, Section XI, for Pressure Testing requirements 9TAC NOS. MC5791)	
ANSI/AWS D1.4-98	Structural Welding Code – Reinforcing Steel	5
ASME B&PV Code Section III Article NB-4000	Fabrication and Installation	1998 Edition 2000 Addenda
ASME B&PV Code Section XI	Welding and Brazing Qualifications	2007 Edition 2000 Addenda
25221-PP-22	Steam Generator Replacement Project Detailed Tendon Program	1
WP&IR: 25221-002-3053-00126	Liner Plate Restoration	
RRP: 2-C0P-3053-126	Repair/Replacement Plan for Liner Plate Restoration	0
WP&IR: 25221-002-3051-00125	Work Package and Inspection Record for Tendon Sheathing Restoration	
0707001-QAR-032	Strand Dedication Report	0
	Bechtel Rebar Splice Test Checklist for Splice Number QH1, IW4855	December 6, 2009
	Bechtel Rebar Splice Test Checklist for Splice Number QH2, IW4855	December 6, 2009
	Bechtel Rebar Splice Test Checklist for Splice Number QV1, IW4855	December 6, 2009
	Bechtel Rebar Splice Test Checklist for Splice Number QV2, IW4855	December 6, 2009
	Bechtel Rebar Splice Test Checklist for Splice Number QH1, IW5180	December 6, 2009

**Section 40A5: Other Activities**

	Bechtel Rebar Splice Test Checklist for Splice Number QH2, IW5180	December 6, 2009
	Bechtel Rebar Splice Test Checklist for Splice Number QV1, IW5180	December 6, 2009
	Bechtel Rebar Splice Test Checklist for Splice Number QV2, IW5180	December 6, 2009
	Bechtel Rebar Splice Test Checklist for Splice Number QH1, IW5243	December 6, 2009
	Bechtel Rebar Splice Test Checklist for Splice Number QH2, IW5243	December 6, 2009
RRP: 2-C0P-3052-124	Repair/Replacement Plan for Construction Opening Rebar Restoration	0
WP&IR: 25221-002-3052-00124	Work Package and Inspection Record for Construction Opening Rebar Restoration	
NCR NO. 25221-002-G61-GCX-00097	Bechtel Nonconformance Report for Liner Plate Nelson Studs	November 21, 2009
CPS JOB NO: 090923-0190	State of California OSHA Certificate of Unit Test and/or Examination of Cranes and Derricks Used for Lifting Service	November 2, 2009
CPS JOB NO: 081004-0029	State of California OSHA Certificate of Unit Test and/or Examination of Cranes and Derricks Used for Lifting Service	October 7, 2009
CPS JOB NO: 071005-0121	State of California OSHA Certificate of Unit Test and/or Examination of Cranes and Derricks Used for Lifting Service	October 7, 2009
SO 23-617-13	Specification for the Installation and Testing if Cadweld Splices	1
ECP 800221009	Relocate and Restore Equipment Hatch	0
ECP 060800698-2	Equipment Hatch Column Splice	0



**Section 40A5: Other Activities**

ECP 800072651	Reactor Coolant System Tie in for the Replacement Steam Generators in Unit 1 (ECP 061200409-28)	0
ECP 800072643	Remove Interferences inside Unit 2 Containment for SGRP (ECP-061200409-20)	0
ECP 800072647	Large Bore Secondary Piping for the SGR Project Unit 2 (ECP 061200409-24)	0
CPS JOB NO: 081004-0029	State of California OSHA Certificate of Unit Test and/or Examination of Cranes and Derricks Used for Lifting Service	September 29, 2009
CPS JOB NO: 081004-0028	State of California OSHA Certificate of Unit Test and/or Examination of Cranes and Derricks Used for Lifting Service	September 27, 2009
CPS JOB NO: 081004-0020	State of California OSHA Certificate of Unit Test and/or Examination of Cranes and Derricks Used for Lifting Service	January 14, 2009
CPS JOB NO: 081004-0020	State of California OSHA Certificate of Unit Test and/or Examination of Cranes and Derricks Used for Lifting Service	January 13, 2009
CPS JOB NO: 081004-0020	State of California OSHA Certificate of Unit Test and/or Examination of Cranes and Derricks Used for Lifting Service	January 2, 2009
CPS JOB NO: 071005-0121	State of California OSHA Certificate of Unit Test and/or Examination of Cranes and Derricks Used for Lifting Service	November 29, 2007
CPS JOB NO: 071005-0122	State of California OSHA Certificate of Unit Test and/or Examination of Cranes and Derricks Used for Lifting Service	December 8, 2007
2MT-002-09	Nondestructive Examination Data Report Magnetic Particle Testing of Polar Crane Main Hook	January 13, 2009

**Section 40A5: Other Activities**

(WP&IR) 25221-002-MOP-7063-00002	S21301ME088 S/G Snubber Work Package	
LCS 3.6.100	Prestressed Concrete Containment Tendon Surveillance Program, Units 2 and 3	4
DBD-SO23-TR-ST	Containment Structure	2
LCS 3.7.108	Snubbers, Units 2 and 3	5
MQ-7471	Mechanical Maintenance Snubbers (Task Qualifications: List of Individuals)	2
	Amendment Application Nos. 105 and 90 Change to Technical Specifications 3/4.7.6, "Snubbers," San Onofre Nuclear Generating Station, Units 2 and 3	May 2, 1991
	Safety related snubber interface with SGRP	December 9, 2009
CS-E03	Cable Splicing, Termination, and Supports	21
25221-000-GPP-GCPE-00003	Cable Splicing, Termination, and Supports	0
ANSI/AWS D1.4-98	Structural Welding Code – Reinforcing Steel	November 6, 1997
25221-PP-05	Steam Generator Replacement Project – Detailed Containment Opening Plan	2
ECP 800072665	SGR U2 Containment Opening	0
ECP 800072665	SGR U2 Containment Opening	0
SO23-617-13	Specification for the Installation and Testing of CADWELD Splices	1
SO23-617-12	Specification for the Purchase of CADWELD Splices	0

Rebar Splice Qualification Test Records

NUMBER

W4169	IW5208	IW4149	IW4170	IW4215
IW4219	IW4220	IW4687	IW5254	IW1416
IW4080				

Bechtel Welding Procedure Specifications

NUMBER

P1-AT-Lh(CVN + 40)

P1-T(RA)(CVN +40)

P3(G3), P1-T(RA)(CVN + 40)

Bechtel Welding Procedure Qualification Records

1242 P1-AT-Lh(CVN +10) Manual Tungsten Arc and Shielded Metal Arc

1282 P3(G3), P1(G1/G2) – T(CVN +10), Manual Gas Tungsten Arc

1320 P1-T(CVN +30) Manual Gas Tungsten Arc

1350 P1-T(ER7OS –S)(CVN +10) Manual Gas Tungsten Arc

1351 P1-A-Lh(CVN +10) Manual Shielded Metal Arc

1352 P1-T(CVN +10) Manual Gas Tungsten Arc

1320 P1-T(CVN +30) Manual Gas Tungsten Arc

1610 P1-T(CVN +10) Manual Gas Tungsten Arc

1619 P3(G3), P1-AT(CVN + 40), Manual Gas Tungsten Arc



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
612 EAST LAMAR BLVD, SUITE 400  
ARLINGTON, TEXAS 76011-4125

June 30, 2010

Mr. Ross T. Ridenoure  
Senior Vice President and  
Chief Nuclear Officer  
Southern California Edison Company  
San Onofre Nuclear Generating Station  
P.O. Box 128  
San Clemente, CA 92674-0128

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION – UNIT 2 STEAM  
GENERATOR REPLACEMENT PROJECT INSPECTION REPORT  
05000361/2010008

Dear Mr. Ridenoure:

On May 17, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed a steam generator replacement inspection at your San Onofre Nuclear Generating Station, Unit 2 facility. The enclosed inspection report documents the inspection findings, which were discussed on May 27, 2010, with Mr. Wharton and other members of your staff.

The inspections examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, no findings were identified. In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, and its enclosure, will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

*/RA/*

Ryan E. Lantz, Chief  
Project Branch D  
Division of Reactor Projects

Docket No. 50-361  
License No. NPF-10

Enclosure:  
NRC Inspection Report 05000361/2010008 w/Attachment: Supplemental Information

cc w/Enclosure:

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File located: R:\\_REACTORS\\_SONGS\2010\SO2010-008-RP-JPR.doc ML

SUNSI Rev Compl.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	ADAMS	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Reviewer Initials	DBA
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RI:RPBD	SRI: RPBD	SPE: RPBD	C: RPBD		
JReynoso	GWarnick	DAllen	RLantz		
<b>/RA by T/</b>	<b>/RA by T/</b>	<b>/RA/</b>	<b>/RA/</b>		
6/30/10	6/30/10	6/28/10	6/29/10		

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**U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV**

Docket: 50-361

License: NPF-10

Report: 05000361/2010008

Licensee: Southern California Edison Co. (SCE)

Facility: San Onofre Nuclear Generating Station, Unit 2

Location: 5000 S. Pacific Coast Hwy  
San Clemente, California

Dates: January 1, 2010 through May 17, 2010

Inspectors: D. Allen, Senior Project Engineer  
G. Warnick, Senior Resident Inspector  
J. Josey, Resident Inspector  
J. Reynoso, Resident Inspector

Approved By: Ryan E. Lantz  
Chief, Project Branch D  
Division of Reactor Projects

## SUMMARY OF FINDINGS

IR 05000361/2010008; 01/01/2010 – 05/17/2010; San Onofre Nuclear Generating Station, Unit 2 Steam Generator Replacement Report; Steam Generator Replacement Activities.

The report covered a 5-month period of inspection by resident and regional inspectors. No findings were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

**A. NRC-Identified Findings and Self-Revealing Findings**

None

**B. Licensee-Identified Violations**

None



## REPORT DETAILS

### Summary of Plant Status

Unit 2 began the inspection period shutdown for a scheduled refueling outage (U2C16) and steam generator replacement. The Unit 2 refueling outage was completed on April 11, 2010 and the plant returned to full power on May 17, 2010.

### 1. REACTOR SAFETY

#### Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### 1R19 Postmaintenance Testing (71111.19)

##### a. Inspection Scope

The inspectors used the guidance in Inspection Procedure 50001 to select and perform the following post-installation verification and testing inspection activities as part of the normal baseline inspection. Accordingly, inspection hours were charged to baseline inspection under NRC Inspection Report 05000361; 05000362/2010003. The inspectors witnessed or reviewed the results of postmaintenance testing for the following maintenance activities:

- March 26, 2010, Unit 2, post-inspection and verification of hot gap measurements for replacement steam generator activities
- April 16, 2010, Unit 2, primary to secondary leakage testing post steam generator replacement
- April 20, 2010, Unit 2, post-installation digital feedwater testing and level control stability
- May 25, 2010, Unit 2, pressurizer monitoring post steam generator replacement
- May 26, 2010, Unit 2, post steam generator replacement reactor coolant system flow acceptance test results

In each case, the test procedures were reviewed to determine if the test adequately verified proper performance of the components affected by steam generator replacement and outage maintenance activities. The Updated Final Safety Analysis Report, Technical Specifications, and design-basis documents were also reviewed as applicable to determine the adequacy of the acceptance criteria listed in the test procedures.

Specific documents reviewed during this inspection are listed in the attachment.

##### b. Findings

No findings of significance were identified.

## 4. OTHER ACTIVITIES

### 40A5 Other Activities (50001)

#### a. Inspection Scope

The inspectors used the guidance in Inspection Procedure 50001 to select and perform the following post-installation verification and testing inspection activities, consistent with the safety significance and inspection resources and as part of normal baseline inspection efforts. Accordingly, some inspection hours were charged to baseline inspection under NRC Inspection Report 05000361; 05000362/2010003.

#### Containment Testing

The inspectors performed system walk downs, observed the start, and conclusion of the Unit 2 containment integrated leakage rate test. The test procedure was reviewed and the inspectors verified that the potential leakage from containment at the design basis accident pressure remained within the limits stated in technical specifications. These inspections are documented in NRC Inspection Report 05000361; 05000362/2010002, Sections 1R04 and 1R19.

#### Steam Generator Secondary Side Leakage

The inspectors reviewed the secondary side leakage test results and completed an inspection of the steam generators secondary side after the steam generators were filled to check for leakage.

#### Calibration and Testing of Instrumentation

The inspectors observed and evaluated the calibration and testing of instrumentation for both the primary and secondary side systems impacted by the steam generator replacement in the following areas:

- Functional testing of spliced resistance temperature detector to reactor coolant system hot leg loops. These inspections are documented in NRC Inspection Report 05000361; 05000362/2010002, Section 1R19.
- Calibration and testing of steam generator E089, wide range water level transmitters following steam generator replacement

#### Startup and Power Ascension

The inspectors reviewed the startup and power ascension procedures to determine if the procedure adequately verified proper performance of the components affected by steam generator replacement and outage maintenance activities. The following inspection activities hours were charged to baseline inspection under NRC Inspection Report 05000361; 05000362/2010003, Section 1R20:

- April 7-8, 2010, Unit 2, reactor startup and criticality following refueling

- April 10, 2010, Unit 2, main generator startup and rollup prior to unexpected trip on high volts to hertz prior to closing breaker

Specific documents reviewed during this inspection are listed in the attachment.

b. Findings

No findings of significance were identified.

**40A6 Meetings**

Exit Meeting Summary

On May 27, 2010, the inspectors presented the inspection results to Mr. M. Wharton, Manager, Steam Generator Replacement Project, and other members of the licensee's staff. The licensee acknowledged the inspection results and observations presented. Some proprietary information was reviewed during this inspection but no proprietary information was included in this report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee Personnel**

D. Axline, Technical Specialist, Nuclear Regulatory Affairs  
D. Bauder, Plant Manager  
G. Cook, Manager, Nuclear Regulatory Affairs  
C. Harberts, Manager, Steam Generator Replacement Project  
L. Hay, QA Manager, Bechtel  
A. Hochevar, Station Manager, Plant Operations  
E. Hubley, Director, Maintenance & Construction Services  
L. Kelly, Engineer, Nuclear Regulatory Affairs  
J. Madigan, Manager, Health Physics  
A. Matheny, System Engineer  
A. Meichler, Mechanical/System Engineering Supervisor  
M. Mihalik, Areva Project Manager, Steam Generator Replacement Project  
R. Nielsen, Supervisor, Nuclear Oversight  
B. Power, Operations Manager, Catalina Pacific  
C. Ryan, Manager, Maintenance & Construction Services  
D. Schaffer, Civil Engineer  
M. Wharton, Manager, Steam Generator Replacement Project

### **LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

#### **Opened and Closed**

None

### **LIST OF DOCUMENTS REVIEWED**

#### **Section 1R19: Postmaintenance Testing**

##### **PROCEDURES**

<b><u>NUMBER</u></b>	<b><u>TITLE</u></b>	<b><u>REVISION</u></b>
SO2-XXVI-9.8001.27277.1	Unit 2 Digital Feedwater Test	1
SO2-XXVI-9.8000.71702.5	Pressurizer Monitoring Post Steam Generator Replacement	0

A-1

Attachment

SO123-XXVI-2.5	Preparation, Review, and Approval of Preoperational, Acceptance, and Special Test Procedures	4
25221-002-M0P-7452-00002-001	SONGS Unit 2 Steam Generator Replacement Thermal Expansion Monitoring Program	April 5, 2010
SO23-3-3.25.1	Once a Shift Surveillance	34
SO23-617-01	Steam Generator Replacement Conformed Specification	4
SO123-I-1.3	Work Activity Guidelines	26
SO2-XXVI-9.8000.71702.3	Replacement Steam Generators Reactor Coolant Flow Acceptance Test	0

**NUCLEAR NOTIFICATIONS**

<u>NUMBER</u>				
200861083	200870136	200729012	200848431	200867229
200735074	200359897	200773569		

**ENGINEERING DOCUMENTS**

<u>NUMBER</u>				
800030264	NECP 800175663	NECP 800071702	800355978	800229428
NECP 800071702	800187271	800072649	800229428	200773569

**Section 1R20: Refueling and Other Outage Activities**

**PROCEDURES**

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
SO23-3-1.1	Reactor Startup	32
SO23-XXXVII-13	Reactor Engineering Procedure on Physics Data Controls	7
SO23-XXXVII-1	Low Power Physics Testing	1

**NUCLEAR NOTIFICATIONS**

<u>NUMBER</u>		
200871982	200872603	200872717

**Section 40A5: Other Activities**

PROCEDURES

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
SO2-V-3.12	Containment Integrated Leakage Rate Test	8
SO23-XXIV-3.8.1	Containment Concrete Visual Examination Summary Sheet	1
SO23-XXIV-3.8.3	In Process Visual Examination of the Temporary Containment Opening	Draft
SO23-XXIV-3.8.3	In Process Visual Examination of the Temporary Containment Opening	0
SO123-XXIV-20.2	Maintenance Rule for Structures	3
SO23-XXIV-3.8.1	Visual Examination of Containment Concrete Surfaces	1
SO2-XXVI-9.8000.71702.3	Replacement Steam Generators Reactor Coolant Flow Acceptance Test	0

NUCLEAR NOTIFICATIONS

<u>NUMBER</u>	
200820640	200748893
200444694	200755001
200715236	200692237
200683811	200556690
200679894	200680999
200715236	200848431
200882926	200722132
200634427	200703527
200796158	200667749
200452049	200452036
200505719	200709732
200872597	200583991
200635121	200722454
200670820	200453360
200722454	

DRAWINGS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
23027	Containment Structure Reinforced Concrete Wall Section & Details	0
23056	Containment Structure Wall Liner & insert Section & Details	0
CO-9000-00001	Containment Structure Scaffold Location at S.I. Tanks & Cable Trays Near Const. Opening	3

ENGINEERING DOCUMENTS

<u>NUMBER</u>
800444646
8000726649

CALCULATIONS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
C-501-01.03	Maintenance Rule - Containment Unit 2 Inspection Report	
S-02-C-001	Maintenance Rule Concrete Crack Inspection and Evaluation	
Bechtel 25221-000-C0C-3000-00004	Evaluation of Containment Opening with 2000 psi Concrete Strength for Tornado Missiles	
C-257-04.02.05	Containment Liner Plate Damage Acceptance Criteria	0

MAINTENANCE ORDERS

<u>NUMBER</u>				
800232914	800356395	800259587	800072665	800072643
WC 70001270	AR 070401220	AR 061200409		

MISCELLANEOUS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
CS-E03	Construction Specification Cable Splicing, Termination, and Supports	22
CS-E02	Construction Specification For Installation of Electrical Cables in Cable Trays	11
Bechtel 25221-000-GPP-GCPE-00003	General Construction Procedure Cable Splicing, Terminations and Supports	
Bechtel	SONGS SGRP Unit 2 Task Readiness Review	
Bechtel 25221-PP-05	Steam Generator Replacement Project Detailed Containment Opening Plan	2
Bechtel	Tendon Removal And Replacement Project Concrete Curing Requirements to Start Tendon Tensioning	

Bechtel NCR 25221-002-G61- GCX-00128	Nonconformance Report	
Bechtel 25221- QSVS-09-009	Quality Surveillance Report	
	Chemistry Management Plan Contingency Defenses for Start Up of Unit 2 Replacement Steam Generators	
Bechtel 25221- 002-M0P-7452- 00002-001	Work Package and Inspection Records for Thermal Expansion Monitoring Program	
SGRP-TP-001	Steam Generator Return to Service Testing Plan	0
	SCE Letter to US NRC Generic Letter 2004-02	
	SCE Tendon Demonstration Presentation to NRC	
Schwager Davis Inc.	Calibration Procedures	1
Bechtel 25221- 000-4MP-T040- S0127	Nondestructive Examination Standard Radiographic Examination RT-Liner Plate NE	0
Bechtel 25221- 000-NWX-YQ- 00001	Welding, Heat Treatment and Nondestructive Examination	2
Bechtel 25221- 002-G61-GCX- 00028	Nonconformance Report	
Bechtel 25221- 000-V04-SY00- 00058-002	Tendon and Grease Removal Procedure	1
Bechtel 25221- 000-V04-SY00- 00012-000	CPTS Tendon Stressing Procedure	4
Bechtel 25221- 000-V04-SY00- 00013-006	CPTS Tendon Greasing Procedure	5



Bechtel 25221- 000-V04-SY000- 00011-004	CPTS Tendon Installation Procedure	3
Bechtel 25221- 000-V04-SY00- 00010-005	CPTS Duct Inspection Procedure	4



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
612 EAST LAMAR BLVD, SUITE 400  
ARLINGTON, TEXAS 76011-4125

May 10, 2011

Mr. Peter Dietrich  
Senior Vice President and  
Chief Nuclear Officer  
Southern California Edison Company  
San Onofre Nuclear Generating Station  
P.O. Box 128  
San Clemente, CA 92674-0128

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION – UNIT 3 STEAM  
GENERATOR REPLACEMENT PROJECT INSPECTION REPORT  
NO. 05000362/2010009

Dear Mr. Dietrich:

On March 30, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed a steam generator replacement inspection at your San Onofre Nuclear Generating Station, Unit 3 facility. The enclosed inspection report documents the inspection findings which were discussed on March 30, 2011, with Mr. Rich St. Onge, Director of Nuclear Regulatory Affairs and other members of your staff. This inspection report is applicable to Unit 3 only.

The inspectors examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, no findings of significance were identified. However, a licensee-identified violation which was determined to be of very low safety significance is listed in this report. The NRC is treating this violation as a noncited violation, consistent with Section 2.3.2 of the NRC Enforcement Policy because of the very low safety significance of the violation and because it is entered into your corrective action program. If you contest the violation or the significance of the noncited violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 612 E. Lamar Blvd, Suite 400, Arlington, Texas, 76011-4125; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the San Onofre Nuclear Generating Station facility.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure(s), and your response if you choose to provide one, will be made available

Southern California Edison

- 2 -

electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy or proprietary information so that it can be made available to the Public without redaction.

Sincerely,

***/RA/***

Ryan E. Lantz, Chief  
Project Branch D  
Division of Reactor Projects

Docket No. 50-362  
License No. NPF-15

Enclosure:  
NRC Inspection Report 05000362/2010009  
w/Attachment: Supplemental Information

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RI:RPBD	SRI:RPBD	RI: R-II/DCP/CPB1	C:RPBD
JReynoso	GWarnick	AMasters	RLantz
<b>/RA/DAllen for</b>	<b>/RA/DAllen for</b>	<b>/RA/</b>	<b>/RA/</b>
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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION IV**

Docket: 50-362

License: NPF-15

Report: 05000362/2010009

Licensee: Southern California Edison Co. (SCE)

Facility: San Onofre Nuclear Generating Station, Unit 3

Location: 5000 S. Pacific Coast Hwy  
San Clemente, California

Dates: October 10, 2010 through March 11, 2011

Inspectors: S. Achen, Reactor Inspector  
I. Anchondo, Reactor Inspector  
S. Makor, Reactor Inspector  
A. Masters, Senior Construction Inspector, Region II  
J. Reynoso, Resident Inspector  
G. Warnick, Senior Resident Inspector  
M. Young, Resident Inspector

Approved By: Ryan E. Lantz  
Chief, Project Branch D  
Division of Reactor Projects

## SUMMARY OF FINDINGS

IR 05000362/2010009; 10/10/2010 – 03/30/2011; San Onofre Nuclear Generating Station, Unit 3 Steam Generator Replacement Report; Steam Generator Replacement Activities.

The report covered a 4-month period of inspection by resident and regional inspectors. No findings of significance were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

**A. NRC-Identified Findings and Self-Revealing Findings**

No findings of significance were identified.

**B. Licensee-Identified Violations**

A violation of very low safety significance, identified by the licensee, has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and corrective action tracking numbers are listed in Section 4OA7.

## REPORT DETAILS

### Summary of Plant Status

Unit 3 began the inspection period shutdown for a scheduled refueling outage (U3R16) and steam generator replacement. The Unit 3 refueling outage was completed on February 18, 2011, and the plant returned to full power on March 3, 2011.

#### 1. REACTOR SAFETY

##### Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### 1R18 Permanent Modification

##### a. Inspection Scope

The inspectors observed and reviewed key affected parameters associated with cable splicing after Unit 3 containment restoration. The inspectors reviewed cable splicing procedures and observed cable splicing, cable tray installation and testing. Inspectors observed technicians performing a review of the procedure steps during the installation of the environmental qualification splices.

The inspectors verified that: modification preparation, staging, and implementation of the splicing activities did not impair emergency/abnormal operating procedure actions, key safety functions, or operator response to loss of key safety functions; post-modification testing will maintain the plant in a safe configuration during testing by verifying that unintended system interactions will not occur; systems, structures and components' performance characteristics still meet the design basis; the modification design assumptions were appropriate; the modification test acceptance criteria will be met; and licensee personnel identified and implemented appropriate corrective actions associated with permanent plant modifications.

Specific documents reviewed during this inspection are listed in the attachment.

##### b. Findings

No findings were identified.

#### 4. OTHER ACTIVITIES

#### 4OA5 Other Activities

##### .1 Design and Planning Inspections

##### a. Inspection Scope

This inspection report documents inspection activities related to the San Onofre Nuclear Generating Station, Unit 3, steam generator replacement project.

These steam generator replacement inspection activities are not part of the normal baseline inspection program, but are performed on an as-needed basis. Therefore, no sample size is specified. The inspectors completed the applicable portion of Inspection Procedure IP 50001, "Steam Generator Replacement Inspection," including the post installation verification and testing inspections.

#### Engineering and Technical Support

Inspections to review engineering and technical support activities were performed prior to, and during, the steam generator replacement outage by resident and regional inspectors. Inspectors reviewed key design aspects and modifications associated with steam generator replacement. The inspectors reviewed the root cause evaluation and the extent of condition of replacement steam generator divider plate-to-channel head weld joint cracking.

The inspectors also reviewed safety analysis changes, permanent plant modifications (engineering change packages) and documentation, including safety screens and evaluations, to verify that they were performed in accordance with regulatory requirements and plant procedures. The inspectors also reviewed manufacturer records of parts and tubes of the replacement steam generators and reviewed preservice baseline eddy current examination results of new tubes. Additional activities were also performed during this inspection and applicable inspections are documented in NRC Inspection Report 05000361/2010005, 05000362/2010005; Sections 1R08, 1R18 and 1R20.

Specific documents reviewed during this inspection are listed in the attachment.

#### Radiation Protection Program

An inspection to review radiation protection controls was performed during the steam generator replacement outage by regional inspectors. The results of the inspection are documented in NRC Inspection Report 05000361/2010005, 05000362/2010005; Sections 2RS01 and 2RS02.

#### Security Considerations and Adverse Impact to Other Unit

The inspectors made frequent observations of security practices to verify that the licensee provided appropriate support for affected vital and protected area barriers during outage activities. The inspectors also checked for potential adverse impacts to Unit 2 (the nonoutage unit) caused by outage activities, equipment configurations, etc.

The inspectors reviewed steam generator replacement activities associated with risk management to minimize any adverse impact on the operating unit and common systems. Additional activities were also performed during this inspection and applicable inspection results are documented in NRC Inspection Report 05000361/2010005, 05000362/2010005; Section 1R13.

Specific documents reviewed during this inspection are listed in the attachment.



b. Findings

No findings were identified.

2. Steam Generator Removal and Replacement Inspections

a. Inspection Scope

The inspectors used the guidance in Inspection Procedure 50001 to select and perform the following inspection activities, consistent with the safety significance and inspection resources and as part of normal baseline inspection efforts.

Welding and Nondestructive Examination Activities

Inspectors reviewed or observed the following welding and nondestructive examination activities during the steam generator replacement outage:

- Qualification certifications for the Non-Destructive Examinations (NDE) examiners
- NDE procedures and NDE technician qualification records to verify they meet ASME code requirements
- Containment restoration plan and the NDE records to verify ASME code requirements were satisfied
- Contractors and Southern California Edison processes to verify they meet ASME code requirements
- Radiography films for several large bore pipe welds to verify the welds meet quality requirements
- Cable tray restoration activities, including post maintenance testing
- Results of mechanical snubber functional testing and associated nonconformance reports and nuclear notifications for safety related snubbers
- Review of the NDE of replacement tubes pre-service inspection results and baseline eddy current examination of tubes

These activities are documented in this report and in NRC Inspection Report 05000361/2010005, 05000362/2010005; Section 1R08.

Specific documents reviewed during this inspection are listed in the attachment.

### Containment Opening Restoration Activities

The inspectors reviewed licensee activities related to construction activities associated with material, design, fabrication, installation, examination and testing of the containment temporary opening and restoration.

The inspectors completed the following inspection activities:

- Observation of restoration activities and review of the modification packages related to equipment hatch supports, containment liner and containment reinforcement bars
- Verification of the ASME code versions and sections to ensure compliance and correct application to the code and other industry standards
- Review of key containment design aspects found in the updated final safety analysis report to confirm there are no deviations from the safety analysis and licensing basis, including review of 10 CFR 50.59 screenings and evaluations
- Review of the liner plate welds strength analysis to verify that the restored liner will be as strong as the original uncut liner
- Review of the containment concrete pour analysis to ensure there will be no adverse impact on the liner plate
- Review of the design requirements of liner plate stiffeners to ensure the design requirements were adequate to withstand the loads imposed during concrete placement operations
- Visual inspections of liner plate stiffeners to confirm proper structural design requirements were implemented
- Confirming the use of dedicated new anchor heads during tendon restoration or if reused anchor heads were placed in service that material integrity was verified by inspection
- Confirmed that new tendon strands were used and adequate to support containment structural requirements
- Review of the tendon duct or sheathing restoration process to ensure the tendon activities were adequate, including grease fill and retensioning, to ensure containment structural integrity was not impacted, including visual inspections of the installed vertical and horizontal replacement tendon sheathing to confirm leak tightness
- Review of the engineering evaluations associated with containment opening repairs to re-enforcement bars including CadWeld joint design and weld splices

- Confirmed use of weld splices in place of CadWelds satisfied code requirements to ensure all aspects of the original containment structural design were met
- Review of the CadWeld purchasing, installation and testing specifications
- Observations of CadWeld sister splices in the field including verification of sister splices made by each welder for the CadWeld splices (under the same conditions and location) and subsequent tensile-testing to ensure adequate tensile strength of the joint was achieved
- Concrete batch plant operations including material storage and handling of concrete components
- Material test results (cement, fine and coarse aggregate, water, and admixtures)
- Concrete mix and proportion data, including batching results
- Concrete transportation and placement

Relative to installation of concrete, the inspectors witnessed placement of concrete in the containment wall to restore the temporary construction opening. The inspectors examined the reinforcing steel to ensure it was installed in accordance with design requirements, was properly cleaned, and observed the concrete forms to ensure tightness and cleanliness. The inspectors reviewed placement activities to ensure that activities pertaining to concrete delivery time, free fall, flow distance, layer thickness and concrete consolidation conformed to industry standards established by the American Concrete Institute (ACI). Concrete batch tickets were examined to ensure that the specified concrete was being delivered to the site. The inspectors also observed testing of the plastic concrete for slump and temperature, including test preparation and molding of the concrete cylinders. Reviews were performed to ensure concrete testing was performed and the cylinders were molded in accordance with applicable American Society Testing and Materials (ASTM) requirements. In addition, the inspectors reviewed activities to ensure that concrete testing was performed by qualified personnel and that concrete placement activities were continuously monitored by licensee and contractor quality control and quality assurance personnel.

The inspectors examined the concrete batch plant to verify proper storage and separation of materials and temperature controls. The inspectors reviewed results of quality control acceptance testing performed on materials (cement, fine and coarse aggregate, and admixtures) used for batching. The inspectors also reviewed records documenting inspection of the concrete batch plant and the concrete truck mixers. Activities were reviewed to determine if the contractor's inspection of the trucks and batch plant were performed in accordance with the guidance of the National Ready Mix Concrete Association, if the batch plant scales were calibrated in accordance with National Ready Mix Concrete Association recommendations, and if mixer efficiency tests were performed on the truck mixers in accordance with ASTM C-94. The inspectors reviewed the concrete mix data to ensure that mix proportions for delivered concrete were selected based on trial concrete mix results, that quality control acceptance criteria

for the plastic concrete were based on the trial mixes, and that the trial mix met concrete strength requirements.

Specific documents reviewed during this inspection are listed in the attachment.

#### Lifting, Rigging and Steam Generator Movement and Reconnection Activities

The inspectors observed and reviewed activities throughout the refueling outage associated with heavy lifting and rigging. The inspectors observed the implementation and reviewed documentation related to several structural modifications associated with the heavy lifting activities.

The inspectors also observed and reviewed engineering evaluations concerning the removal and reinstallation of the following structural modifications:

- Construction of the outside lift system and runway
- Lifting and rigging preparations associated with old steam generators removal
- Interference removal and replacement of new steam generators
- Temporary handling equipment construction and removal
- Structural supports to facilitate steam generator replacement

The results of these inspections are documented in NRC Inspection Report 05000361/2010005, 05000362/2010005; Section 1R18.

The following activities were also reviewed:

- Reactor cavity decking construction and removal
- Movement and reconnection of replacement steam generators
- Steam generator hold down / skirt bolts material condition
- Transfer of old steam generators to temporary storage

Specific documents reviewed during this inspection are listed in the attachment.

#### Outage Operating Conditions

The inspectors used Inspection Procedure 71111.20 to verify proper outage conditions such as defueling, reactor coolant drain down, system isolation and equipment tagging. The results of these inspections are documented in NRC Inspection Report 05000361/2010005, 05000362/2010005; Section 1R20.

### Post-Installation Verification and Testing

Selective inspections and reviews were conducted by the inspectors on steam generator post-installation verification and testing including:

- Reactor coolant system leakage testing and water inventory balance
- Steam Generator secondary side leakage testing
- Hot gap measurement for replacement steam generator snubbers and restraints
- Distributed control system functional testing main turbine and feedwater controls

Specific documents reviewed during this inspection are listed in the attachment.

### Containment Testing

The inspectors performed system walk downs, valve alignment checks, and observed the initiation, and conclusion of the Unit 3 containment integrated leakage rate test. The inspectors reviewed the test procedure and verified that the potential leakage from containment at the design basis accident pressure remained within the limits stated in technical specifications. The results of these inspections are documented in NRC Inspection Report 05000361/2011002, 05000362/2011002; Sections 1R04 and 1R19.

### Steam Generator Secondary Side Leakage

The inspectors reviewed the secondary side leakage test results, and conducted a visual inspection of the steam generator's secondary side after the steam generators were filled to check for leakage.

Specific documents reviewed during this inspection are listed in the attachment.

### Calibration and Testing of Instrumentation

The inspectors observed and evaluated the calibration and testing of instrumentation for both the primary and secondary side systems impacted by the steam generator replacement in the following areas:

- Functional testing of spliced resistance temperature detector to reactor coolant system hot leg loops. These inspections are documented in NRC Inspection Report 05000361/2011002, 05000362/2011002; Section 1R20
- Calibration and testing of steam generator E089, wide range water level transmitters following steam generator replacement. These inspections are documented in NRC Inspection Report 05000361/2011002, 05000362/2011002; Section 1R19
- Setpoints and calibration changes to replacement steam generator level instruments. These inspections are documented in NRC Inspection Report 05000361/2011002, 05000362/2011002; Section 1R19

Specific documents reviewed during this inspection are listed in the attachment.

### Foreign Materials Control

The inspectors performed frequent observations of the steam generator replacement activities to verify the licensee was implementing proper foreign materials controls. In particular, the inspectors observed controls related to reactor coolant system and secondary side openings.

Specific documents reviewed during this inspection are listed in the attachment.

### Temporary Services

The inspectors reviewed the work package and drawings, and then observed the installation, use, and removal of temporary services in the containment building during the outage. Instructions for the use and controls for construction power, acetylene, oxygen, and argon were reviewed, and the actual installation of each system was compared to the approved system sketches.

Specific documents reviewed during this inspection are listed in the attachment.

### Startup and Power Ascension

The inspectors reviewed the startup and power ascension procedures to determine if the procedure adequately verified proper performance of the components affected by steam generator replacement and outage maintenance activities. The results of these inspections are documented in NRC Inspection Report 05000361/2011002, 05000362/2011002; Section 1R20.

Specific documents reviewed during this inspection are listed in the attachment.

## b. Findings

### 1. Adequacy of Model Inputs Used in Restoration of Nuclear Concrete Containment Structures

Introduction. The inspectors identified an unresolved item regarding the licensee's engineering modeling inputs related to restoration of Unit 2 and 3 containment buildings. During the inspection, insufficient information was available to determine if newer industry standards are appropriate to apply in the licensee finite element modeling of concrete stresses. The inspectors also questioned if the alternate modeling was allowed by NRC approved codes. The licensee considered using the inputs from the newer industry standards as an analytical refinement and not a methodology change. The inspectors could not determine if the licensee properly applied the Title 10 CFR 50.59 process to conclude the new analysis did not involve a departure from approved methods of evaluation. To address the concern, a Technical Interface Agreement (TIA 2011-008) was initiated with the NRC Office of Nuclear Reactor Regulation.

Discussion. During performance of the inspection, the inspectors reviewed three related engineering calculations and the screening required by 10 CFR 50.59 associated with the SONGS Unit 3 containment restoration. The licensee performed calculations and

evaluations of the structural integrity of the restored containment building. The calculations reviewed in conjunction with the inspection referenced models and equations from two contemporary reports; ACI 209R-92, "Prediction of Creep, Shrinkage, and Temperature Effects in Concrete Structures," and ACI 224.2R-92, "Cracking of Concrete Members in Direct Tension." These two ACI reports were not referenced in the licensee's concrete construction code of record, which is ACI 318-71, "Building Code Requirements for Reinforced Concrete," and BC-TOP-5, "Prestressed Concrete Nuclear Reactor Containment Structures." These reports were also not referenced in the licensee's final safety analysis report. The NRC determined the licensee's 10 CFR 50.59 evaluation did not address the referenced models and equation inputs from ACI 209R-92 and ACI 224.2R-92. Upon further questioning by the NRC about the appropriate use of the inputs, engineering personnel concluded that inputs from these reports did not represent a change in methodology to the original approved evaluation, in part, because the inputs were needed to address cracking, as required per the original analysis and was considered a calculation refinement. Pending review of documentation to determine if inputs from these reports do represent a change in methodology as described in the 10 CFR 50.59 evaluation, this issue will remain an Unresolved Item (URI) and tracked as URI 05000362/2010009-01; "Adequacy of Model Inputs Used in Restoration of Concrete Containment Structures."

#### **40A6 Meetings**

##### Exit Meeting Summary

On January 20, 2011, the inspectors presented a brief of the team inspection results to Mr. Mike Wharton, Manager, Steam Generator Replacement Project, and other members of the licensee's staff.

On March 11, 2011, the inspectors presented inspection results to Mr. Craig Harberts, Manager, Steam Generator Replacement Project, and other members of the licensee's staff.

On March 30, 2011, the inspectors presented the final inspection results to Mr. Rich St. Onge, Director, Nuclear Regulatory Affairs.

The licensee acknowledged the inspection results and observations presented.

Some proprietary information was reviewed during this inspection but no proprietary information was included in this report.

#### **40A7 Licensee-Identified Violations**

The following finding of very low safety significance was identified by the licensee and is a violation of NRC requirements which met the criteria of Section 2.0 of the NRC Enforcement Policy, for being dispositioned as a noncited violation.

Contrary to 10 CFR, Part 50, Appendix B, Criterion III, "Design Control", the licensee failed to assure that design bases were correctly translated into

instructions for adjusting steam generator snubbers to their cold settings. On December 28, 2010, after entry into Mode 6, engineering discovered three of the four steam generator snubbers outside the design cold settings. The snubbers had been adjusted without consideration of the reactor coolant temperature. A subsequent change in reactor coolant temperature caused the snubbers to contract beyond the cold set allowance. The snubbers were reworked and adjusted to acceptable cold settings. The finding was determined to be of very low safety significance because it did not increase the likelihood of a loss of reactor coolant system inventory or degrade the licensee's ability to add reactor coolant inventory when needed. The issue was entered into the licensee's corrective action program as Nuclear Notifications NNs 201260722 and 201262831.

ATTACHMENT: Supplemental Information



**SUPPLEMENTAL INFORMATION**  
**KEY POINTS OF CONTACT**

Licensee Personnel

D. Axline, Technical Specialist, Nuclear Regulatory Affairs  
D. Bauder, Vice President and Station Manager  
D. Calhoun, Senior Nuclear Engineer  
E. Curley, QC Inspector, Bechtel  
D. Czapski, Civil Inspector Level III  
C. Harberts, Manager, Steam Generator Replacement Project  
L. Hay, QA Manager, Bechtel  
S. Hetherington, Civil Superintendent, Bechtel  
E. Hubley, Director, Maintenance & Construction Services  
L. Kelly, Engineer, Nuclear Regulatory Affairs  
B. Kotteakos, Manager, Vendor Oversight  
M. Lewis, Manager, Health Physics  
A. Matheny, System Engineer  
T. McCool, Plant Manager  
A. Meichler, Mechanical/System Engineering Supervisor  
M. Mihalik, Areva Project Manager, Steam Generator Replacement Project  
R. Nielsen, Supervisor, Nuclear Oversight  
B. Power, Operations Manager, Catalina Pacific  
C. Ryan, Manager, Maintenance & Construction Services  
R. St. Onge, Director, Nuclear Regulatory Affairs  
D. Schaffer, Senior Nuclear Engineer  
D. Todd, Manager, Site Projects Oversight  
M. Wharton, Manager, Steam Generator Replacement Project

**LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

Opened

05000362/2010009-01    URI    Adequacy of Model Inputs Used in Restoration of Nuclear  
Concrete Containment Structures

Opened and Closed

None

## LIST OF DOCUMENTS REVIEWED

### Section 1R18: Permanent Modification

#### PROCEDURES

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
25221-000-GPP- GCPE-00003	General Construction Procedure "Cable Splicing, Terminations, and Supports"	3
25221-003-E0P- 7351-09006	Cable Splicing Inspection Record, 3XB09110a	0
25221-003-EOP- 7351-08803	SONGS Unit 3 SGRP – Work Package	0

#### DRAWINGS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
SO23-617-3- M173	San Onofre Nuclear Generating Station Unit 3 Bechtel Number 25221-003-EOK-2000-00029-002 Electrical Materials List Order # 800072644 (061200409-21)	2

#### CALCULATIONS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
M-85121	EQ Document Package- Nuclear Grade Cable Accessories – New Formulation	5

#### MISCELLANEOUS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
NMO 800467844	SGR 3C16 WPIR 8803 3A034 work instructions	0
NECP 800072644	Remove Interferences Inside Unit 3 Containment for SGRP (ECP 061200409-21)	0

### Section 40A5: Other Activities

#### PROCEDURES

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
SO123-XV-5	Nonconforming Material, Parts, or Components	20
SO123-XV-50	Corrective Action Program	19

SO123-XV-50.CAP-1	Writing Nuclear Notifications for Problem Identification and Resolution	5
SO123-XXIV-3.8.1	Visual Examination of Containment Concrete Surfaces	2
SO1223-XXIV-3.8.3	In Process Visual Examination of the Temporary Containment Opening	0
EOP-M-0002	Material Test and Receipt Equipment Operation Guideline, SATEC MII 400 HVL-1067	1
San Onofre 2&3 FSAR Section 3.8.1	Concrete Containment	
SO23-2-1.1	Main Feedwater Diverse Trip Tests	16

NUCLEAR NOTIFICATIONS

<u>NUMBER</u>				
201262794	201262795	200703527	200715236	201246811
201248624	201251137	201260722	201262831	

WORK ORDERS

<u>NUMBER</u>				
800601025	800476248	800511293	800467844	800072644
800072650	800508764	8000314616		

DRAWINGS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION</u>
SO23-916-18	Steam Generator Sliding Base Installation	4
ECN D00442876	Steam Generator Sliding Base Installation	4
23027	SH 2, Containment Structure Reinforced Concrete Wall Section & Details, SHT. 5	0
20000	General Notes	14

CALCULATIONS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION / DATE</u>
SO23-409-2-10-M32	RCP/Steam Generator Hydraulic Snubbers	0
C-257-04.02.01 ECN D0035216	Finite Element Analysis for Stiffener Plates for Containment Liner Replacement	September 10, 2010
CS-C2	Concrete Placement and Grouting	20

CS-C4	Reinforcement Steel Placement	9
CS-C5	Structural Steel Erection	14
20123-201-09	Specification for Ready-Mixed Concrete for SONGS 1, 2 and 3	4
S023-617-10	Specification for the Purchase of Containment Opening Concrete	2
S023-617-11	Specification for the Purchase of Reinforcing Steel	0
S023-617-12	Specification for the Purchase of Cadweld Splices	0
S023-617-13	Specification for the Installation and Testing of Cadweld Splices	1
Engineering Change Package (ECP) No. 800072669 (ASC No. D0042675)	Unit 3 Containment Opening	0
C-257-01.04.05	Evaluation of Restored Containment - Concrete Modulus Ratio and Tendon Retensioning Forces	0
C-257-01.04.06	Evaluation of Restored Containment: End-of-Life Analysis	0
Engineering Change Notice (ECN) No. D0020134, Calc. No. C-257-01.04.06		September 22, 2009
SO23-617-1-C1030	SONGS Unit2/3-Evaluation of the Impact of RSGs on the COLSS Functional Design and CPC/CEAC Functional Design Specifications	0
25221-003-G61-GCX-00124	E-089 Feedwater RT Indication	1
25221-000-C0C-7100-00011	OLS and Runway Erection and Collapse Load Drop Effects	0
25221-000-MoC-1000-00002	SONGS Steam Generator Drop Dose Analysis	0
<u>WP&amp;IR CHANGE NOTICES</u>		
	<u>NUMBER</u>	<u>DATE</u>
	25221-003-C0N-3053-00126	November 29, 2010
	25221-003-C0N-3053-00126	December 01, 2010

NONDESTRUCTIVE EXAMINATION REPORTS

NUMBER

MT-U3-027	MT-U3-028	MT-U3-029	MT-U3-030	MT-U3-031
MT-U3-032	MT-U3-033	MT-U3-034	MT-U3-035	MT-U3-036
MT-U3-037	MT-U3-038	MT-U3-045	MT-U3-046	MT-U3-047
MT-U3-050	MT-U3-052	MT-U3-069	MT-U3-070	MT-U3-071
MT-U3-073	MT-U3-074	MT-U3-075	MT-U3-076	MT-U3-077
MT-U3-078	MT-U3-079	LT(VB)-001	RT-U3-286	RT-U3-287
RT-U3-288	RT-U3-291	RT-U3-292	RT-U3-293	

MISCELLANEOUS

<u>NUMBER</u>	<u>TITLE</u>	<u>REVISION / DATE</u>
P1-A-Lh	Welding Procedure Specification (Manual shielded metal arc welding of carbon steel materials.)	0
NWR-YQ-1310	Welding Procedure Qualification Record	June 28, 2001
25221-003-C0P-3053-00126	CTMT Opening-Liner Plate	0
3-C0P-3053-00126	Repair/Replacement Plan (RRP) CTMT Opening-Liner Plate	0
25221-003-C0P-3053-00126-000	SONGS Unit 2 Steam Generator Replacement Project Work Package and Inspection Records	June 23, 2010
25221-003-C0P-3053-00126-002	SONGS Unit 2 Steam Generator Replacement Project Work Package and Inspection Records	October 28, 2010
	Inspection Report for Steam Generator Sliding Base Nuts Inspection Lot 10000031206	January 10, 2011
131606	Certification of Steam Generator Sliding Base Nuts	January 9, 2011
SO23-617-1-M1414	SONGS Unit 2/3 RSG Divider Plate Weld Joint Separation Root Cause Evaluation Report	0
1370-PE-503	Project Specification for Steam Generator Sliding Base for Southern California Edison San Onofre 2 & 3	3
NECP 800072650	Small Bore Piping for the SGR Project Unit 3 (ECP 061200409-27)	0

NECP 800072650 (ASC D0036716)	Small Bore Secondary Piping for the SGR Project Unit 3 (ECP 061200409-27) Applicable Section Change	0
NMO 800508764	Support SGR: Re-range 3LT1106(NECP)	0
J-ABA-010	Steam Generator Wide Range Level Transmitter Scaling	September 2, 2010
J-ABA-002	Steam Generator Narrow Range Level Transmitter Scaling	September 2, 2010
J-ABB-059	Scaling Calculation For Main Steam Flow Transmitter	June 1, 2009
Change Notice No. 2008-33	Steam Generator Replacement	November 19, 2008
UFSAR 2/3-15.10 CAN D0031803	RCPSS & IOSGADV (w/ & w/o SF) AST dose analysis	April 26, 2010
Change Notice No. D0030223	UFSAR Updated for U2C16 Reload Analysis	March 19, 2010
WCAP-16811-P	SONGS Units 2 and 3 Replacement Steam Generator Project NSSS Licensing Topical Report	October 2007
S023-617-10-M9	Catalina Pacific – Mix Design	0
Twining Laboratories	Laboratory Testing of Coarse and Fine Aggregate	October 1, 2009
CTL Group	Petrographic Examination of Coarse and Fine Aggregate Samples	September 28, 2009
Vendor Calibration Report for Satec HVL 400	Asset Number PE-0138, performed by Instron Calibration Laboratory	January 26, 2010
Personnel Qualification Standard for SATEC 400K Tensile/Compression Machine (TX0202)		1
Personnel Qualification Records Examination Report	Visual Examination of the Containment Construction Opening Concrete Surface prior to ILRT	January 19, 2011

Examination Report	Visual Examination of the Containment Construction Opening Concrete Surface at ILRT Test Pressure	February 2, 2011
Examination Report	Visual Examination of the Containment Construction Opening Concrete Surface After the ILRT	February 22, 2011
Nonconformance Report (NCR) No. 25221-003-G61-GCX- 00126		
HPCR 25221-003- G61-GCX-00101	Outside Lift System Strand Jack Binding	1